Journal of the Kansas Entomological Society

(Central States Entomological Society)

Vol. 28 January, 1955 Number 1

PUBLICATION COMMITTEE

MARY H. MICHENER, Editor, Lawrence
R. H. BEAMER, Lawrence R. H. PAINTER, Manhattan
DWIGHT ISELY, Fayetteville, Ark.

PAUL BOWEN LAWSON
1888-1954

Entered as second-class matter June 7, 1939 at the Post Office at Manhattan, Kansas, under the Act of August 24, 1912.

JOURNAL OF THE KANSAS ENTOMOLOGICAL SOCIETY

A quarterly journal published in January, April, July, and October devoted to Entomology in the Western Mississippi Basin and the proceedings of the Kansas Entomological Society.

Manuscripts for publication may be sent to the Editor, Mary H. Michener, care of Department of Entomology, University of Kansas, Lawrence, Kansas or to any member of the publication committee.

The Kansas Entomological Society does not make exchanges since the Society does not maintain a library.

Subscriptions to the Journal must be paid in advance. The subscription rate is so low that second notices are not ordinarily sent out.

Payment of Canadian or other foreign subscriptions and bills must be made by international Postal Money Order or by a draft on a New York bank and payable in U.S.A. dollars.

Subscribers are urged to give us their full cooperation in these matters.

Subscriptions should be sent to Donald A. Wilbur, Department of Entomology, Kansas State College, Manhattan, Kansas.

Subscriptions in the U.S.A.	**$2.00 per year**	**Single Copy**
Canadian or foreign subscriptions,	**$2.25 per year**	**75 cents**

KANSAS ENTOMOLOGICAL SOCIETY

President, HERBERT KNUTSON
Vice-President, FLOYD D. MINER
Secretary-Treasurer, DONALD A. WILBUR

Vol. 28, No. 1, January, 1955

This issue mailed January 25, 1955

Kansas Entomological Society
Vol. 28 January, 1955 Number 1

NOTES ON DISTRIBUTION OF THE WESTERN CORN ROOTWORM, *DIABROTICA VIRGIFERA* LEC., IN KANSAS (Coleoptera: Chrysomelidae)[1]

by

C. C. Burkhardt and Harry R. Bryson[2]

The Western or Colorado corn rootworm, *Diabrotica virgifera* Lec., is a comparatively recent pest of the growing corn plant in Kansas. This insect caused severe losses in corn in some areas of the State during the 1953 growing season.

Diabrotica virgifera was first reported injurious to corn in Kansas in Norton County in the summer of 1945 (Bryson et al., 1953). Bryson and Wilbur of Kansas State College conducted a survey on August 6 of the following year in several northern Kansas counties to determine the distribution of these beetles. The survey revealed the presence of an abundance of beetles feeding on the leaves, tassels, and silks of corn in Norton County.

Beetles were collected in Smith and Phillips counties in 1947 (Smith and Dean, 1948) and in Osborne County in 1948. A considerable increase in population and damage by this insect occurred in the vicinity of Smith, Jewell, and Phillips counties in 1948 (Smith and Dean, 1950). During 1949, reports of the presence of these insects were received from Rawlins, Decatur, Jewell, Republic, and Cloud counties and actual collections were made in Scott and Finney counties. The reports from Jewell, Republic, and Cloud counties were authenticated by a survey in 1952. Although this survey was by no means complete, adults were collected in these 11 counties, in addition to those already mentioned: Rooks, Mitchell, Lincoln, Ottawa, Saline, Washington, Clay, Dickinson, Marshall, Riley, and Geary counties. Negative findings in Nemaha, Pottawatomie, and Wabaunsee counties in 1952, established the known eastern boundary of the species during that year.

A survey was again conducted during the latter part of July and early August in 1953. This survey included a careful examination of several cornfields in each of 61 counties covering the northwestern two-thirds of the state of Kansas. Adults were found in 50 of the 61 counties surveyed. The results of the 1953 survey are shown in Figure 1. The shaded area indicates counties in which the adults of *D. virgifera* were collected regardless of numbers and does not necessarily indicate the exact limits of its distribution. Data available indicate that this species of corn rootworm moved in an easterly direction approximately 30 to 35 miles during the 1953 growing season. Adults were found as far east as Nemaha, Pottawatomie, Wabaunsee, Morris, and Chase counties.

[1] Contribution No. 619, Department of Entomology.

[2] Instructor and Associate Professor respectively in the Department of Entomology, Kansas State College, Manhattan.

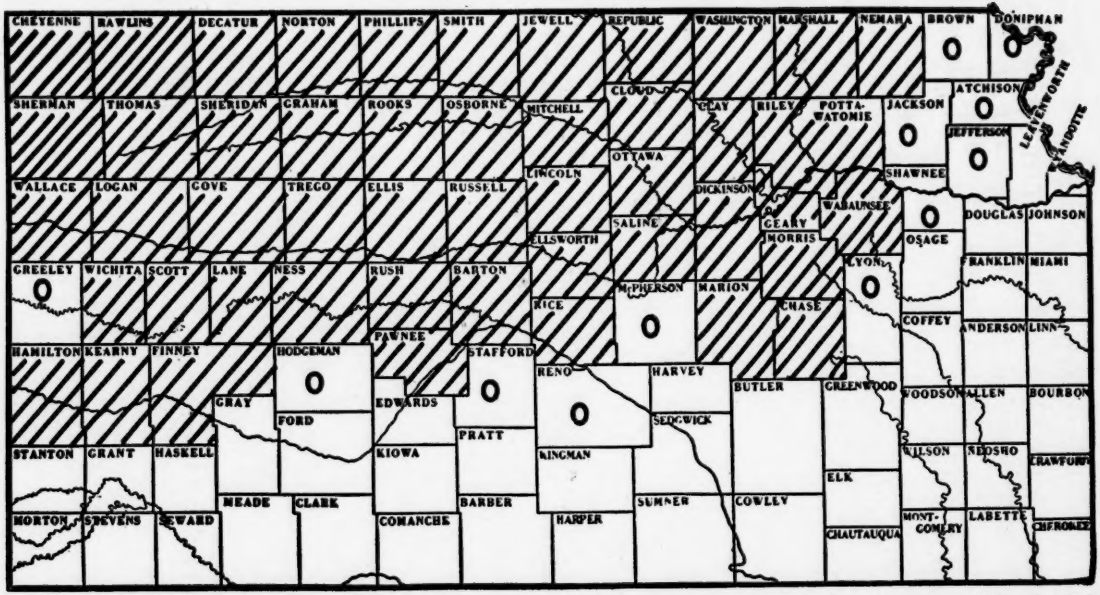


Figure. 1. Collections of the Western corn rootworm adults during 1953. Beetles were found in shaded counties and not found in counties marked zero. Counties left blank were not surveyed.

The greatest abundance of beetles occurred on corn in the northern tier of counties, of which Jewell and Republic counties suffered the highest estimated loss in corn crop. It was not uncommon in these counties to find 100 beetles per corn plant.

On numerous occasions, adults of *D. virgifera* were collected in blossoming alfalfa fields by sweeping with an insect net. Some of these fields were isolated as much as one-quarter of a mile from any cornfield. In one instance beetles were found in an isolated field of corn at least three-quarters of a mile from any source of infestation.

LITERATURE CITED

1. Bryson, Harry R., Donald A. Wilbur and C. C. Burkhardt. 1953. The Western corn rootworm, *Diabrotica virgifera* Lec. in Kansas. Jour. Econ. Ent. 46 (6): 995-999.
2. Smith, Roger C. and Geo. A. Dean. 1948. The seventeenth or 1947 annual insect population summary of Kansas. Jour. Kansas Ent. Soc. 21(1):25.
3. Smith, Roger C. and Geo. A. Dean. 1950. The eighteenth or 1948 annual insect population summary of Kansas. Jour. Kansas Ent. Soc. 23(1):9.

THE *DACUS (AFRODACUS)* BEZZI OF THE WORLD (Tephritidae, Diptera)[1]

D. ELMO HARDY[2]
University of Hawaii Agricultural Experiment Station
Honolulu, Hawaii

Dacus (Afrodacus) Bezzi

Afrodacus Bezzi. 1924. Ann. S. Afr. Mus. 19:469.
Dacus (Afrodacus), Hardy. 1951. Pac. Sci. 5(2):117.

This subgenus is characterized by lacking anterior supra-alar bristles and by having two scutellar bristles and two prescutellars, a supernumerary lobe in the wing of the male, and a row of strong cilia on each side of the third abdominal tergum in the male. It is very close to *Dacus* (*Strumeta*) Walker, differing only by lacking anterior supra-alar bristles.

Genotype: *Chaetodacus biguttulus* Bezzi.

Key to the Known Species of *Dacus* (*Afrodacus*) of the World

1. Wings with infuscations along either the r-m or the m crossveins 2
   Wings without infuscations on the crossveins 5
2. Only the r-m crossvein infuscated. Face with the usual black spots or all yellow 3
   Only the m crossvein infuscated. Face with a black transverse band. (Java) .....*javanensis* (Perkins)
3. Just one pair of well developed inferior fronto-orbital bristles (a second, rudimentary, pair may sometimes be present). Scutellum unicolorous, yellow to rufous. Costal band very faint and indistinct (fig. 6a). African species 4

[1] Published with the approval of the Director of the Hawaii Agricultural Experiment Station as Technical Paper No. 290.

[2] Entomologist, University of Hawaii Agricultural Experiment Station, College of Agriculture, Honolulu.

Three pairs of inferior fronto-orbitals present. Scutellum brown on the apical two-thirds, with a transverse yellow band across the base (fig. 5a). Costal band distinct (fig. 5b). (Australia) ..... *brunneus* (Perkins and May)

4. Face all yellow. Mesonotum with a pair of submedian silvery stripes extending longitudinally almost its entire length. (Africa) ..... *nigrivenatus* Munro

Face with a pair of black spots. Mesonotum without silvery stripes. (South Africa) ..... *lucidus* Munro

5. Mesonotum with just two postsutural yellow vittae. Face with the usual black spots 6

Mesonotum with three yellow vittae (fig. 7a). Face clear yellow, with no markings 10

6. Humeri and notopleural calli not joined by a yellow band 7

Humeri and notopleural calli joined by a broad yellow band. (Australia) ..... *jarvisi* (Tryon)

7. Costal band very narrow and indistinct (fig. 4b). Scutellum chiefly dark reddish brown, yellow on the sides (fig. 4c). (Africa) ..... *biguttulus* Bezzi

Costal band distinct (fig. 2b). Scutellum all yellow or entirely brownish yellow, darker on the sides 8

8. Scutellum brownish yellow, concolorous with the mesonotum and darker on the sides than in the center. Cubital streak very faint, not extending into the narrowed portion of the cubital cell (only females known). (Samoa) ..... *aenigmaticus* Malloch

Scutellum yellow. Cubital streak broad and distinct, extending at least to the apex of the cubital cell in both sexes 9

9. Scutellum yellow, except for a narrow band of black across the base ..... *aberrans* Hardy—9a

Apex of scutellum dark brown. (Australia) ..... *mesoniger* (May)

9a. Mesonotum yellow to rufous with no black markings. (India) ..... *aberrans pallescentis* n. subsp.

Mesonotum conspicuously marked with black 9b

9b. Mesonotum all black, except for the yellow vittae. Sides of abdominal terga four and five with black markings. (Malaya) ..... *abberans nigritus* n. subsp.

Mesonotum extensively rufous, with a black pattern arranged as a narrow central and two sublateral longitudinal vittae and a large prescutellar spot (as in fig. 1a, Hardy, 1951, Pac. Sci. 5(2):119). Sides of terga four and five without black markings. (Australia) ..... *aberrans aberrans* Hardy

10. Costal cells yellow fumose, almost entirely filled with microtrichia. Costal band extending to tip of vein M_{1+2}. (Australia) ..... *tigrinus* (May)

Costal cells hyaline, devoid of microtrichia except at extreme apices. Costal band ending just beyond vein R_{4+5}. (India) ..... *trilineatus* n.sp.

Dacus (*Afrodacus*) *aberrans* Hardy

Fig. 1

Dacus (*Afrodacuo*) *aberrans* Hardy. 1951. Pac. Sci. 5(2):118-120, figs. 1a-c.

This species is readily recognized by the characters given in the above key. The typical form has extensive black markings on the mesonotum and has no black markings on the sides of segments three to five. The preapical setae of the female ovipositor are arranged as in fig. 1.

The original description and figures are adequate for this species.

Length: body, 5.5-5.8 mm.; wings, 4.8-5.0 mm.

Type locality: Lake Barrine, Queensland, Australia. ex *Litsea* (?)

Type in the United States National Museum.

Dacus (*Afrodacus*) *aberrans nigritus* n. subsp.

Fig. 2a-c

This form differs from typical *aberrans* by being extensively black The mesonotum is all black except for the yellow vittae, and the sides of abdominal terga four and five are conspicuously marked with black (fig. 2a). The front is unspotted as in the typical form. The costal band is distinctly developed (fig. 2b). The ovipositor is like that of *aberrans* except in the development and arrangement of the preapical setae. In *nigritus* three short setae are arranged close together on each side and one is displaced forward (fig. 2c). The apical pair of setae are very minute and are clearly visible only under oil emersion. The differences in the preapical setae may be of specific importance but in view of the close similarity to *aberrans,* in other structural details, it is best that it be considered a subspecies.

In details other than those given above it agrees with the description of *aberrans* (Hardy, 1951, Pac. Sci. 5(2):118-120, figs. 1a-c). The wing (fig. 2b) was not figured for the typical form.

Holotype male, allotype female and three paratypes (males): Singapore, Malaya, ex *Cinnamomum iners,* May, 1949 (N. L. H. Krauss).

Type and allotype deposited in the United States National Museum. One paratype each in the following collections in Honolulu: Territorial Board of Agriculture and Forestry, B. P. Bishop Museum, and the University of Hawaii.

Dacus (*Afrodacus*) *aberrans pallescentis* n. subsp.

Fig. 3

The specimens on hand from India appear to be conspecific with *Dacus aberrans* Hardy, from Australia. The Indian specimens seem to differ only in some details of body coloration and to a slight degree in the extent of development of the subapical setae on the ovipositor. *D. aberrans pallescentis* is distinguished from typical *aberrans* by having no black markings on the mesonotum and by having conspicuous black markings on the sides of terga four and five. The front has brown spots on the sides at the bases of the fronto-orbital bristles. The subapical setae on the female ovipositor are smaller than in typical *aberrans* and are all approximately equal in size (fig. 3). In other structural details *pallescentis* fits typical *aberrans.*

The black markings on the abdomen are very similar in pattern to those of *D. abberans nigritus* n. subsp., from Singapore. The first three terga pos-

sess black basal bands. The band on the second tergum is sometimes slightly interrupted on each side just before the middle and the band on the third is very broad, extending over about one-half of the third segment. Terga three to five have a broad, longitudinal, black vitta extending to the apex of abdomen as seen from a dorsal view. The fourth and fifth terga have conspicuous black markings on the sides; these extend dorsad along the bases of the segments and extend about one-third of the distance across the dorsum on each side.

The legs are yellow, except for the brownish hind tibiae. The costal band of the wing is comparatively narrow, it does not extend below vein R_5 except at its apex. The first two costal cells are hyaline and devoid of microtrichia except at the apex of the second cell. The cubital streak is moderately narrow; it fills only about the basal half of cell M_4. The narrowed portion of the cubital cell is approximately two times longer than the distance from the apex of the cubital cell to the wing margin.

Length: body, 5.0 mm.; wings, 4.8 mm.

Holotype male, allotype female, and twenty-two paratypes, thirteen males and nine females: 22 miles south of Ranikhet, U.P., India, ex *Mimusops* sp.? June 20, 1949 (I. M. Newell).

Type, allotype, and four paratypes are deposited in the United States National Museum. The remainder of the paratypes are being distributed among the following museums and collections in Honolulu, T.H.: B. P. Bishop Museum, Hawaiian Sugar Planters' Association, University of Hawaii, and the Board of Agriculture and Forestry.

Dacus (*Afrodacus*) *aenigmaticus* Malloch

Dacus aenigmaticus Malloch. 1931. Ins. Samoa 6(7):261-262.

This species was described from a single headless female and the characteristics of the head have not been reported. It appears to be related to *D. aberrans* Hardy and is distinguished by the discolored scutellum and by the very poorly developed cubital streak in the wings.

Malloch's description indicates that the thorax is shining brownish yellow, with two pale vittae down the center of the mesonotum and with the scutellum concolorous with the mesonotum. The abdomen is colored like the thorax with a black, median longitudinal vitta and with black marks on the sides of segments two to four. The details of the ovipositor were not given in the original description except that the base is conical, yellow anteriorly and blackened posteriorly. The legs are yellow except for the dark brown hind tibiae. The wings are yellowish hyaline. The brown costal streak is narrow and extends around the costal margin to beyond the middle of cell R_5. The cubital streak is very faint and does not extend into the narrowed portion of the cubital cell. The r-m crossvein is oblique and is situated at the apical two-fifths of cell 1st M_2.

Length: 5.0 mm. (approximately).

Male unknown.

Type locality: Upolu, Malololelei, Samoa. Host unknown.

Type in the British Museum (Natural History).

I have not seen this species.

Dacus (*Afrodacus*) *biguttulus* (Bezzi)

Figs. 4a-e

Chaetodacus biguttulus Bezzi. 1922. Boll. Lab. Zool. Portici 15:294.

This species is easily recognized by the broad brownish red band extending longitudinally over the scutellum (fig. 4c) and by the very narrow, indistinct costal band (fig. 4b). It differs from the other African species of *Afrodacus* by having two broad black stripes down the mesonotum (fig. 4c); by the coloration of the scutellum and by the lack of dark coloring on the r-m crossvein.

MALE. *Head*: Front yellow, with an indistinctly brown median spot and faintly brownish spots at the bases of the frontal bristles. The front is parallel-sided and is approximately one-fourth as wide as the head. Two pairs of inferior fronto-orbital and one pair of superior fronto-orbital bristles are present. The two black spots on the face are round and are broader than the third antennal segment. The third antennal segment is slightly longer than the face. *Thorax*: Predominantly rufous, yellow on the humeri, notopleura, mesopleura, top edge of sternopleura, hypopleura, sides of scutellum and with a very narrow, yellow postsutural vitta down each side of the mesonotum (fig. 4c). The front and side margins of the humeri are rufous so the yellow coloring is confined to a streak down the center. The black vittae extend from the front margin of the mesonotum, between the inner and outer scapular bristles, to about opposite the end of the yellow vittae, then they broaden laterally and extend nearly to the inner postalar bristles (fig. 4c). The black stripes are covered by gray pubescence. *Legs*: Entirely yellow except for brownish hind tibiae. *Wings*: Almost entirely hyaline. The two costal cells and the basal cells are devoid of microtrichia. The subcostal cell (the stigma) is brownish yellow; cell R_2 is faintly yellowed along its upper margin; cell R_3 has a narrow streak of yellow along its lower apical margin which extends into the upper portion of cell R_5. The cubital streak is brownish yellow and is not strongly differentiated. Vein $Cu_1 + 1st\ A$ is slightly less than one-half as long as the narrowed portion of the cubital cell. The r-m crossvein is situated just beyond the middle of cell 1st M_2 (fig. 4b). *Abdomen*: Almost entirely rufous, the third tergum with a large black spot on each side. The genitalia (fig. 4a) are chiefly yellow.

Length: body, 6.0 mm.; wings, 5.0 mm.

FEMALE. Vein $Cu_1 + 1st\ A$ is nearly equal in length to the narrowed portion of the cubital cell and abdominal segments two to four have black spots on the sides; otherwise fitting the description of the male except for sexual characters. The sixth tergum is slightly less than one-third as long as the fifth. *Ovipositor*: Rather short and inconspicuous, the visible portion is approximately equal in length to the fifth abdominal segment; the extended ovipositor (fig. 4d) is 3.27 mm. in length. The piercer measures 1.04 mm. in length by .21 mm. at its widest point. The apical portion is strongly tapered to a slender point beyond the opening of the oviduct (fig. 4e). The oviduct ends about .37 mm. from the apex of the piercer. No preapical setae are present on the piercer. The inversion membrane is 1.1 mm. long by .28 mm. at its widest point. The rasper extends to within .21 mm. of the base of the seg-

ment. The base of the ovipositor is 1.13 mm. long by .96 mm. measured across the base of the segment. The spiracles are situated about .25 mm. from the base of the seventh segment, measured to the lateral margins.

Type locality: East London and Knysna.

Cotypes apparently at Portici. Some were also in the Bezzi collection.

This species is known to infest four species of the genus *Olea* in South Africa. It is commonly referred to as "the two spotted olive fly." (Note: The "two spots" refer to the pale yellow markings on the sides of the scutellum.) The details of its biology have been published by Munro, 1924, Union of S. Afr. Dept. Ent. Mem. 2:12-15, pls. II and IV.

I have studied specimens from Durban, "bait trap," 8/7-3/8/33 (W. E. Marriott).

Dacus (*Afrodacus*) *brunneus* (Perkins and May)

Figs. 5a-d

Afrodacus brunneus Perkins and May. 1949. Univ. Queensland Dept. Biol. 2(14):18-20, fig. 9.

This species is differentiated from other known *Afrodacus* from the Pacific area by having the r-m crossvein infuscated. It differs from *D. nigrivenatus* Munro and *lucidus* Munro (from Africa), which also possess this character, by having three pairs of inferior fronto-orbital bristles; by the brown apex of the scutellum (fig. 5a); by the broad costal band (fig. 5b) and by the details of the ovipositor as described and figured below.

The original description and figures are adequate for this species, except for the characteristics of the female ovipositor. *Ovipositor*: The exposed portion is tubular in shape and is about one and one-third times longer than the fifth abdominal segment. The extended ovipositor is 4.28 mm. long and is very slender (fig. 5d) compared to its width. The piercer is needle-like, 1.25 mm. long, broadest at base (.1 mm.) and gradually tapered to the apex. The opening of the oviduct is situated about .1 mm. from the tip of the piercer. The preapical setae are very tiny and are visible only under high magnification; the distal pair are about .025 mm. from the tip of the piercer. The apical portion is crenulated on the sides, three pairs of small notches are present (fig. 5c). The inversion membrane is 1.5 mm. long by .16 mm, at its widest point. The rasper extends to within 1.0 mm. from the base of the segment. The basal segment is 1.53 mm. long by 1.19 at its widest point. The spiracles are situated .49 mm. from the base of the segment, measured to the posterior lateral margins.

Length: body, 5.8 -6.0 mm.; wings, 4.9-5.5 mm.

Type locality: Gayndah and Stanthorpe, Queensland, Australia (no type designated). Trapped in citrus and deciduous fruit orchards.

Location of cotypes: University of Queensland.

I have seen specimens from Toowoomba, Feb. 1950, ex lure traps (A. W. S. May) and Gatton, March 1950, ex lure traps (A. W. S. May).

Dacus (*Afrodacus*) *jarvisi* (Tryon)

Chaetodacus jarvisi Tryon. 1927. Proc. Roy. Soc. Queensland 38(14):201-203.
Dacus (*Chaetodacus*) *australis* Hendel. 1928. Ent. Mitteil. 17 (5):341-342.
Dacus (*Chaetodacus*) *australis* var. *halterata* Hendel. op. cit.: 342-343. New synonymy.
Dacus (*Afrodacus*) *jarvisi*, Hardy. 1951. Pac. Sci. 5(2):120-121, figs. 2a-b.

The variety *halterata* was described from a single female specimen taken at Cairns. Dr. E. M. Hering (in correspondence) said that he had studied the type of *halterata* and that is "is only an individual form of *jarvisi*." I have studied a large series of specimens from the Cairns area and have seen none which fits the description of *halterata*. It is supposed to differ from typical *jarvisi* by having the halteres reddish brown, rather than yellow; the squamae and fringes yellow, rather than white and the anterior notopleural bristles situated on a reddish brown ground color, rather than being located within the confines of the yellow band connecting the humeri and the notopleural calli. It seems probable that Hendel's specimen was discolored and I doubt that this should be considered as a distinct variety.

This species is distinguished from other *Afrodacus* by the continuous yellow markings connecting the notopleural calli and the humeri. The species is entirely rufous, with yellow markings, except for the black facial spots, a narrow brown to black band across the bases of abdominal segments two and three and a narrow brown to black median vitta extending longitudinally from terga three to five. The description and figures given by Hardy (loc. cit.) are adequate for this species.

Length: body, 6.5-7.0 mm.; wings, 6.0-6.5 mm.

Type locality: Stanthorpe, South Queensland, Australia, ex *Careya australis*.

Type in the Queensland Museum.

The species is known only from Queensland. It is often a serious pest and infests a variety of different fruits.

Dacus (*Afrodacus*) *javanensis* (Perkins)

Afrodacus javanensis Perkins. 1938. Proc. Roy. Soc. Queensland 49(11):132-134.

This species is distinguished from other known *Afrodacus* by having a transverse band of black across the face; by having the m crossvein infuscated and by the very broad mesopleural stripe. The yellow mesopleural stripe extends from the hind margin of the humerus to the base of the wing. The costal band is distinct but does not extend into cell R_3 until the apex of vein R_3. The costal band enlarges at the wing tip into a large conspicuous, apical spot.

The species is known only from the type female. The original description was adequate, except for the details of the ovipositor and except that no figures were presented.

Length: body, excluding ovipositor, 7.5 mm.; wing, 6.0 mm.

Male unknown.

Type locality: Mt. Ardjoena, East Java. No host given.

Type in the British Museum (Natural History).

I have not seen this species.

Dacus (*Afrodacus*) *lucidus* Munro

Dacus (*Afrodacus*) *lucidus* Munro. 1939. Jour. Ent. Soc. S. Afr. 1:26.

This species appears most closely related to *D. nigrivenatus* Munro but is distinguished by the black spots on the face and by the absence of the silvery vittae on the mesonotum. It is separated from *D. biguttulus* Bezzi by

having just one pair of inferior fronto-orbitals, by the infuscated r-m crossvein and by the yellow scutellum.

The following details are taken from the original description. An entirely pale species without dark markings, except on the face. *Head*: The front is yellow and is about one-third as wide as the head. One pair of superior fronto-orbital and one pair of inferior fronto-orbital bristles are present. The antennae are a little longer than the face. Face with two round black spots. *Thorax*: Entirely ferruginous except for the humeri and for the mesopleural stripes. Apparently there are no discernible postsutural yellow vittae on the mesonotum. The halteres are yellow. *Legs*: Pale colored except for slightly darkened hind tibiae. *Wings*: Costal band very narrow and poorly developed. Crossvein r-m broadly infuscated. Cubital streak moderately developed. The narrowed portion of the cubital cell is one and one-half times longer than vein Cu_1+1st A in the male and one and one-third times longer in the female. *Abdomen*: "Broad, about one-third its own width wider than thorax, strongly punctate, segments free." The base of the ovipositor measures 1.0 mm.

Length: body and wings, 5.5 mm.

Type locality: Mossel Bay, Cape Province, S. Africa. No host given.

Type in the British Museum (Natural History).

I have not seen this species.

Dacus (*Afrodacus*) *mesoniger* (May)

Afrodacus mesoniger May, 1951, Queensland Journ. Agr. Sci. 8(1):4-6, fig. 2.

This species may possibly be identical with *D.* (*Afrodacus*) *aberrans* Hardy. From the original description it appears to differ by having the scutellum dark brown at the apex; the lower one-third of the hypopleural calli black (not all yellow) and the mesonotum more extensively black (not marked with rufous in the median portion or around the humeri).

Length: body, 6.0 mm.; wings, 5.8 mm.

Type locality: Toowoomba, Queensland, in lure traps. Paratypes from Alston, Cunningham's Gap, Queensland, ex fruits of *Neolitsea involucrata*.

Type in the Queensland Museum, Reg. No. T. 5264.

Dacus (*Afrodacus*) *nigrivenatus* Munro

Figs. 6a-c

Dacus (*Afrodacus*) *nigrivenatus* Munro. 1937. Jour. E. Afr. and Uganda Nat. Hist. Soc., Special Suppl. 5:1-2.

This species is distinguished from other *Afrodacus* by its pale color, by its all yellow face, by the two silvery white vittae down the mesonotum and by other details as described and figured below.

MALE. Entirely yellow to rufous with no dark markings and with black bristles. *Head*: Front about one and one-third times longer than wide and with no dark spots. Usually only a single (lower) pair of inferior fronto-orbital bristles is present; some specimens have a weak pair of upper inferior fronto-orbitals. The superior fronto-orbitals are lacking. The face is clear orange-yellow with no markings. The antennae are rufous, the third segment is about equal in length to the face. *Thorax*: Rufous except for the yellow humeri and the mesopleural stripes. The mesonotum is unicolorous and has a pair of submedian gray vittae extending longitudinally almost the full

length. *Wings*: With a very narrow costal band, as in fig. 6a. *Abdomen*: With pale pubescence and with a row of brown to black cilia on the sides of the third tergum.

Length: body, 5.5 mm.; wings, 5.0 mm.

FEMALE. Fitting the description of the male except that vein Cu_1+1st A is nearly as long as the narrowed portion of the cubital cell. *Ovipositor*: Short, not conspicuously developed. The extended ovipositor (fig. 6b) measures approximately 3.5 mm. in length. The piercer is 1.1 mm. long by .21 mm. at its widest point. It is rather gradually tapered beyond the oviduct (fig. 6c) and not so slenderly pointed as in *biguttulus* (fig. 4e). There is no evidence of preapical setae being present. The piercer has a rasper, down the median portion, composed of numerous small posteriorly directed teeth. These teeth extend almost to the opening of the oviduct (fig. 6c). A row of microscopic setae are situated near the lateral margins of the piercer. These extend from the base to just beyond the opening of the oviduct. The oviduct opens about .36 mm. from the apex of the piercer. The inversion membrane (eighth segment) is 1.15 mm. long by .26 mm. at is widest point. The rasper of the eighth segment extends to within .26 mm. of the base of the segment. The basal segment is 1.21 mm. long by 1.04 mm. wide, measured across its hind margin. The spiracles are situated .31 mm. from the base of the seventh segment, measured to the posterior lateral margins.

Length: body, 5.5-6.0 mm.; wings, 5.0 mm.

Type locality: Nairobi, Kenya, ex *Duranta repens*.

Type (according to Dr. Munro) sent to the Coryndon Museum, for later deposition in the British Museum. I have examined a series of sixteen specimens from Nairobi, Kenya, April to June 1936, ex *Duranta plumieri* (N. L. H. Krauss). Two of these are paratypes.

Dacus (*Afrodacus*) *tigrinus* (May)

Afrodacus tigrinus May, 1952, Queensland Jour. Agr. Sci. 9(4):339-341, fig. 3.

The description of this species came to my attention after my manuscript had been sent to the editor and this new information has been inserted.

D. tigrinus is remarkably close to *D. trilineatus* n.sp., from India. These two are the only known species of *D.* (*Afrodacus*) which have three postsutural yellow vittae on the mesonotum, the face clear yellow with no black markings, and the yellow mesopleural stripe expanded on the upper portion and extending to the humerus. *D. tigrinus* differs from *trilineatus* by having the costal cells fumose and covered with microtrichia and the costal band more broad, extending to the tip of the vein M_{1+2} and expanded into an apical spot between the tips of veins R_{4+5} and M_{1+2}. From May's figure it appears that the fourth section of the costa is longer than the fifth and cell R_2 at the tip of vein R_{1+2} is broader than cell R_3 opposite this point. The median postsutural yellow vitta on the mesonotum is broad, filling all of the space between the prescutellar bristles and extending posteriorly nearly to the scutellum. The abdomen is predominantly yellow. The first tergum has a small black spot on each anterior lateral margin, two and three have narrow black bands across their bases and the black median vitta is present only on terga four and five; the vitta is interrupted on the basal half of four and near the base of five.

In *trilineatus* the costal cells are hyaline, devoid of microtrichia except at their extreme apices and the costal band is very narrow, greatly attenuated in cell R_3 and expanded into a spot at tip of vein R_{4+5} (fig. 7c). Cell R_2 is narrower than R_3 opposite the tip of vein R_{1+2}. The fourth costal section is about three-fourths as long as the fifth. The median yellow vitta is narrow, about one-half as wide as the space between the prescutellars and does not extend posteriorly as far as the prescutellar bristles. (fig. 7b). The abdomen is chiefly black, terga one to four have broad black basal bands, three and four are largely black and the median vitta extends uninterrupted over terga three to five.

Length: body, 5.3 mm.; wings, 4.5 mm. Known only from the female.

Type locality: Kamerunga Expt. Sta., Cairns, Queensland.

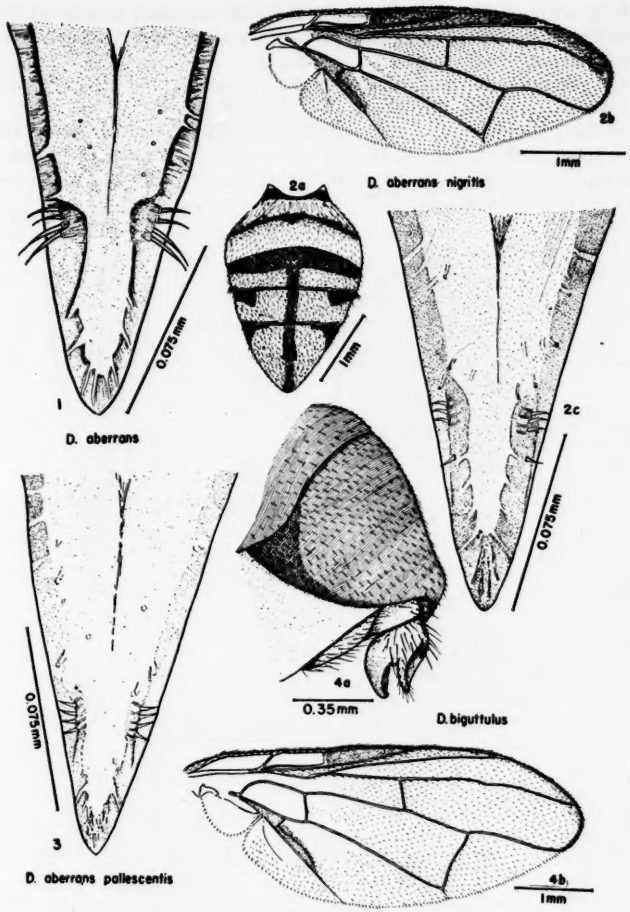
Type in the Queensland Museum, Reg. No. T. 5274.

Dacus (*Afrodacus*) *trilineatus* n .sp.

Figs. 7a-c

This species is distinguished from all other known members of the subgenus (except *tigrinus* (May), see discussion under that species) by the presence of three yellow vittae on the mesonotum; by the continuation of the yellow coloration of the mesopleura onto the humeri (fig. 7b); by lacking facial spots and by the strongly narrowed costal band of the wing.

MALE. *Head*: Front slightly less than two times longer than wide and discolored with brown at bases of frontal bristles. Two pairs of inferior fronto-orbital and one pair of superior fronto-orbital bristles. Face clear yellow, with no spots. Occiput largely dark brown to black, except for broad yellow border adjoining eye magins. Antennae yellow to rufous. Third segment slightly over three times longer than wide and about equal in length to face. Back of head convex and about half as wide as one compound eye at its broadest point. *Thorax*: Predominantly shining black in ground color. Mesonotum with three postsutural yellow vittae. Lateral vittae extend from suture to outer posterior supraalar bristles. Median vitta narrower than lateral pair and extends about halfway between suture and scutellum. Median portion of mesonotum faintly grayish pollinose, bisected by narrow shining black line (fig. 7a). Entire dorsum of thorax covered with short, yellow setae. Top margins of mesopleura entirely yellow, color continuous to humeri (fig. 7b). Humeri all yellow except for black line across lower margins. Scutellum yellow except for basal black line. Metanotum subshining black. Halteres entirely yellow. *Legs*: Yellow except apices of hind femora brown on dorsum. Hind tibiae faintly brownish at tips. *Wings*: Costal band greatly attenuated, nearly interrupted in first half of cell R_3 (fig. 7c). First two costal cells hyaline, devoid of microtrichia except for few hairs in apex of second cell. The r-m crossvein straight but oblique in position, situated slightly beyond middle of discal cell. Cubital streak very narrow, scarcely extends outside of cubital cell and fills only small, basal portion of cell M_4. Narrowed portion of cubital cell slightly over two times longer than that section of wing from apex of cubital cell to wing margin. No distinct supernumerary lobe in wing although slight undulation present at margin opposite end of vein Cu_1+1st A. *Abdomen*: Predominantly black with broad yellow bands across apices of terga one and two;



EXPLANATION OF FIGURES*

1. *Dacus* (*Afrodacus*) *abberans* Hardy. Apex of female ovipositor, from Hardy, 1951. Pac. Sci. 5(2):119, fig. 1c.
2. *D.* (*Afrodacus*) *aberrans nigritus* n. subsp. a. abdomen of male, dorsal view; b. wing of female; c. apex of female ovipositor.
3. *D.* (*Afrodacus*) *aberrans pallesentis* n. subsp. Apex of female ovipositor.
4. *D.* (*Afrodacus*) *biguttulus* (Bezzi). a. male genitalia, lateral (in situ); b. wing of male;

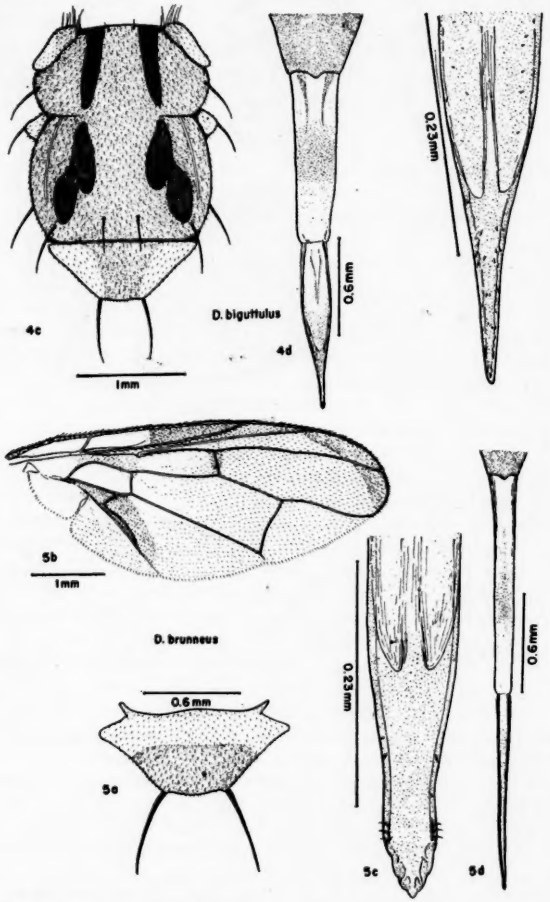
*The drawings were all made by Marian S. Adachi, University of Hawaii.

with submedian yellow spots on terga three and four, and with fifth tergum largely yellow. Black longitudinal vitta down terga three to five. Posterior lateral margins of fifth tergum largely black.

Length: body, 5.6 mm.; wings, 4.8 mm.

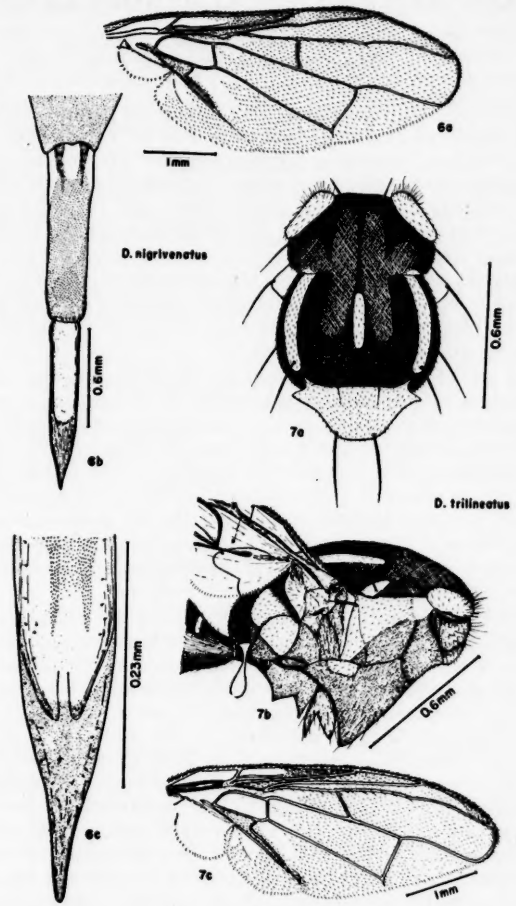
Female unknown.

Holotype male and one paratype male Sarakki Village, Bangalore, India, ex "Thonda fruit"[1], adults by about 1st December, acc. no. 139/35 (Gurney). One paratype male, Kodaikanal, S. India, January 1951, ex *Cephalandra indica,* (N. D. Waters).



[1] Mr. F. A. Bianchi (Hawaiian Sugar Planters Association) has supplied the scientific name *Cephalandra indica* for the plant known as "Thonda" in South India.

Type and one paratype returned to the Commonwealth Institute of Entomology, London; one paratype in the United States National Museum.



EXPLANATION OF FIGURES

4. *Dacus* (*Afrodacus*) *biguttulus* (Bezzi). c. thorax, dorsal view; d. female ovipositor, full length; e. apex of female ovipositor.
5. *D.* (*Afrodacus*) *brunneus* (Perkins). a. scutellum; b. wing of male; c. apex of female ovipositor; d. ovipositor, full length.
6. *D.* (*Afrodacus*) *nigrivenatus* Munro. a. wing; b. female ovipositor, full length; c. apex of ovipositor.
7. *D.* (*Afrodacus*) *trilineatus* n. sp. a. thorax, dorsal view; b. thorax, lateral view; c. wing of male.

AN ANNOTATED LIST OF POMPILID WASPS TAKEN AT BLACKJACK CREEK, POTTAWATOMIE COUNTY, KANSAS (HYMENOPTERA)[1]

HOWARD E. EVANS AND CARL M. YOSHIMOTO
Cornell University, Ithaca, N.Y.

Wasps of the family Pompilidae are for the most part distributed rather thinly in nature, occuring in greatest abundance in places where both suitable spider hosts and suitable nesting sites are plentiful. Since adults of most species require a certain amount of nectar, the presence of plants with readily accessible nectaries is also a factor in their distribution. The greatest number of species nest in sandy or light clay soil having a moderately high moisture content; other species nest in the loam and litter of woodland areas, in prairies, wastelands, crevices in rocks, etc. On rare occasions one finds a restricted area providing virtually all the requirements of these wasps, and when this occurs one is often startled by the abundance of individuals and the numbers of species occurring in close proximity.

This is a brief report on collections of Pompilidae and their prey made during parts of the summers of 1952 and 1953 at Blackjack Creek, Pottawatomie County, Kansas. The area in question is a small one, about .2 of a mile wide and slightly less than a mile long, extending from the environs of the new bridge on U.S. Highway 40 upstream to the end of permanent water. In this small area 45 species of Pompilidae were taken without making any attempt to collect the area exhaustively; in fact, most of our time was spent on biological studies, and on some days few if any specimens were taken. It seems certain that several additional species might have been taken with more intensive collecting, especially on flowers.

Blackjack Creek arises from several springs in the midst of a group of ancient sand hills. Along the stream are many slopes, banks, and bars in various stages of erosion and accumulation, all consisting of light sand of varying degrees of moisture content. The valley contains a rich and rather dense vegetation, thus supporting an abundance of insects and the spiders which prey upon them. The trees are predominantly oaks and catalpas, with smaller numbers of willows, elms, and other trees. Early in the season some of the willows are often covered with honeydew, and some of the catalpas seem to attract Hymenoptera to their foliage. In May and June the flowers of pepper grass, *Lepidium densiflorum* Schrad., are highly attractive to many of the smaller Pompilidae, and in mid-summer there are stands of white sweet clover, *Melilotus alba* Desr., and two species of Umbelliferae which serve as sources of nectar for several species. From early July into September, there are dense stands of partridge pea, *Cassia fasciculata* Michx., growing on sandy flats back from the stream. These plants attract great numbers of small Hymenoptera, which seek concealment in the foliage and apparently obtain nectar from glands at the bases of the leaves.

[1] These studies were undertaken as part of a project on the comparative ethology of solitary wasps, supported by the National Science foundation on grant NSF G-248.

In this area, 17 species of spiders were found to be used as prey by 15 of the 45 species of Pompilidae. One species of spider, the very common *Arctosa littoralis* (Hentz), served as host for six species of spider wasps. One spider wasp, *Sericopompilus apicalis* (Say), was found to prey upon no less than 9 species of spiders. More detailed studies have already been published on two of the species of Pompilidae (Evans, Lin, and Yoshimoto, 1953, Jour. New York Ent. Soc., 61: 61-78), and it is planned to publish certain others in the future. We are indebted to Dr. W. J. Gertsch, of the American Museum of Natural History, for identifying the spiders for us.

SUBFAMILY PEPSINAE

Hemipepsis ustulata ustulata Dahlbom. 1 ♂, June 16, on *Polygonum*. This is the easternmost record of this species known to us.

Priocnemioides fulvicornis (Cresson). 1 ♂, July 11, on flowers of *Melilotus*.

Priocnemis cornica (Say). Innumerable specimens, May 31-Sept. 9; males visiting flowers of *Lepidium* in numbers; females using the following spiders as prey: LYCOSIDAE: *Arctosa littoralis* (Hentz), imm., (2 records); *Pirata sedentarius* Montgomery, ♀, (3 records); *Lycosa avida* Walck., imm.; *Lycosa* sp., imm.; OXYOPIDAE: *Oxyopes salticus* Hentz, imm.

Calicurgus hyalinatus alienatus (Smith). 1 ♂, May 27, on *Lepidium*; 1 ♀ Aug. 4, on sand with an immature spider of the genus *Araneus* (ARANEIDAE).

Auplopus caerulescens subcorticalis (Walsh). 1 ♀, Aug. 12, walking along branch of a catalpa tree carrying the spider *Phidippus audax* (Hentz), imm. (SALTICIDAE).

Ageniella (*Ageniella*) *pallida* Banks. 1 ♀, July 3.

A. (*Priophanes*) *agenioides* (Fox). 1 ♀, June 20.

A. (*P.*) *arcuata* (Banks). 2 ♀ ♀, July 11, 14.

SUBFAMILY CEROPALINAE

Ceropales bipunctata bipunctata Say. 1 ♀, June 23, on flowers of *Melilotus;* 1 ♂, July 16.

C. femoralis Cresson. 2 ♂ ♂, July 16, on foliage of *Cassia.*

SUBFAMILY POMPILINAE

Evagetes mohave (Banks). 16 ♀ ♀, 13 ♂ ♂, May 30-Sept. 9. Males on willow honeydew and foliage of *Cassia;* females on sand and acting as cleptoparasites of *Anoplius apiculatus autumnalis* (Banks) (see Evans, Lin, and Yoshimoto, op. cit., pp. 72-77).

E. padrinus minusculus (Banks). 2 ♀ ♀, July 16, Aug. 4, on sand.

E. parvus (Cresson). 3 ♀ ♀, 4 ♂ ♂, on sand, on willow honeydew, and on foliage of *Cassia.*

Sericopompilus angustatus (Cresson). 1 ♀, July 2.

S. apicalis (Say). 28 ♀ ♀, 40 ♂ ♂, June 12-Sept. 9, on foliage of *Cassia* and of catalpa; on flowers of *Melilotus;* females nesting in sparse vegetation along the edge of woods and preying upon the following spiders: SALTICIDAE: *Paraphidippus chrysis* (Walck.), ♀ (6 records); *P. putnami* (Peckham), ♀ (3 records); *Phidippus audax* (Hentz), ♀ (2 records); *Thiodina sylvana*

(Hentz), ♀; THOMISIDAE: *Xysticus funestus* Keys., ♀, *X. ferox* (Hentz), ♀; ARANEIDAE: *Eustala anastera* (Walck.), ♀, *Neoscona* sp.; OXYOPIDAE: *Oxyopes scalaris* Hentz, ♀.

Episyron biguttatus biguttatus (Fabricius). 1 ♀, 1 ♂, July 16-21, on sand and on umbelliferous flowers.

E. quinquenotatus quinquenotatus (Say). 2 ♀ ♀, 3 ♂ ♂, July 2-14, on sand; female preying upon an immature spider of the genus *Neoscona* (ARANEIDAE) and nesting in sand.

E. snowi (Viereck). 4 ♀ ♀, 1 ♂, June 20-Aug. 12, some on foliage of *Cassia.*

Poecilopompilus algidus algidus (Smith). 1 ♀, 2 ♂ ♂, July 2-3, on flowers of *Melilotus.*

P. interruptus interruptus (Say). 9 ♀ ♀, 2 ♂ ♂, June 16-July 16; visiting foliage of *Cassia;* females preying upon *Acanthepeira stellata* (Walck.), ♀ (ARANEIDAE) (6 records), and nesting in moist sand along the creek in late afternoon.

Tachypompilus ferrugineus ferrugineus (Say). 1 ♀, July 3.

Anoplius (Lophopompilus) atrox (Dahlbom). 1 ♀, June 18.

A. (L.) cleora (Banks). 5 ♀ ♀, 5 ♂ ♂, May 27-Aug. 12; on sand; females preying upon *Arctosa littoralis* (Hentz) (LYCOSIDAE) and nesting in sandy banks.

A. (Notiochares) amethystinus atramentarius (Dahlbom). 12 ♀ ♀, 9 ♂ ♂, June 11-Sept. 9; visiting *Melilotus, Polygonum,* and *Cassia;* females nesting in bare places along the edges of woods and using as prey *Lycosa rabida* Walck., ♀ (3 records), and *Arctosa littoralis* (Hentz), ♂ (LYCOSIDAE).

A. (Arachnophroctonus) americanus juxtus (Cresson). 2 ♀ ♀, 17 ♂ ♂, June 16- Aug. 8; males on *Cassia;* females preying on *Arctosa littoralis* (Hentz) (3 records) and *Schizocosa crassipes* (Walck.), ♀ (LYCOSIDAE) and nesting in sand banks.

A. (A.) apiculatus autumnalis (Banks). Innumerable specimens, May 31-Sept. 9; on sand along stream; many records of females with spiders, always *Arctosa littoralis* (Hentz), imm. (LYCOSIDAE) (see Evans, Lin, and Yoshimoto, op. cit., pp. 61-72).

A. (A.) marginalis (Banks). 3 ♀ ♀, 7 ♂ ♂, June 12-Sept. 3; one female nesting along the edge of a corn field about 20 feet from the stream, provisioning the nest with *Lycosa baltimoriana* (Keys.), ♀ (LYCOSIDAE).

A. (A.) relativus (Fox). 3 ♀ ♀, June 20-Aug. 12; one female preying on *Geolycosa missouriensis* (Banks), imm. (LYCOSIDAE), and nesting in side of grassy bank.

A. (A.) semirufus (Cresson). 4 ♀ ♀, 2 ♂ ♂, May 27-Aug. 1; one female on flowers of *Lepidium;* two females nesting in sand and using as prey *Lycosa rabida* Walck., imm. (LYCOSIDAE) (see Evans, 1953, Syst. Zool., 2: 167-169).

A. (Pompilinus) cylindricus (Cresson). 1 ♀, 2 ♂ ♂, May 25-July 16; one male on flowers of *Lepidium;* female on sand.

A. (P.) insolens (Banks). 2 ♀ ♀, 4 ♂ ♂, May 25-Aug. 7; males on flowers of *Lepidium.*

A. (P.) marginatus (Say). 6 ♀ ♀, 1 ♂, May 25-June 23; several females on flowers of *Lepidium;* one female preying on *Schizocosa crassipes* (Walck.), ♀ (LYCOSIDAE).

A. (P.) percitus Evans. 3 ♀ ♀, 7 ♂ ♂, May 25-31; entire series on *Lepidium.*

A. (P) splendens (Dreisbach). 1 ♀, 12 ♂ ♂, May 27-Aug. 2; males on *Lepidium,* both sexes on *Cassia.*

A. (P.) stenotus bequaerti (Dreisbach). 1 ♂, May 25, on *Lepidium.*

A. (P.) subcylindricus (Banks). 3 ♀ ♀, 9 ♂ ♂, May 25-30, on *Lepidium.*

A. (Anoplius) illinoensis (Robertson). 1 ♀, 15 ♂ ♂, May 25-27, entire series on flowers of *Lepidium.*

A. (A.) imbellis (Banks). 1 ♀, Aug. 12, along stream.

A. (A.) ithaca (Banks). 5 ♀ ♀, June 20-Aug. 2; on sand along stream; one female with the spider *Arctosa littoralis* (Hentz), imm. (LYCOSIDAE). This is an unusual habitat for *ithaca,* which is generally characteristic of rocky places.

A. (A.) ventralis ventralis (Banks). 1 ♀, 6 ♂ ♂, May 25-Aug. 12; males on *Lepidium* and *Cassia.*

A. (A.) virginiensis (Cresson). 1 ♂, May 25, on *Lepidium.*

Aporinellus apicatus (Banks). 1 ♀, June 20, on sand.

A. completus Banks. 2 ♀ ♀, June 6, July 14, on sand.

A. fasciatus (Smith). 3 ♀ ♀, 2 ♂ ♂, June 8-Sept. 3, on sand.

Paracyphononyx funereus (Lepeletier). 1 ♀, July 2.

BIOLOGICAL STUDIES IN THE GENUS *PERICLISTA*[1] (Hymenoptera, Tenthredinidae, Blennocompinae)

ROBERT E. BEER
Lawrence, Kansas

Adult specimens of the species selected for the biological study presented in this paper were first collected by the writer in the early spring of 1947, at Strawberry Canyon, Berkeley, California. They were retained unidentified in my collection until the following year. On February 27, 1948, great numbers of adults were collected in Woolsey Canyon, Berkeley, California. They were abundant on the hillside vegetation beneath large live oak trees, *Quercus agrifolia* Nee. Males outnumbered females almost ten to one. On March 2, 1948, males of the species were congregated around many small live oak trees on the University of California campus at Berkeley. Females were actively engaged in selecting sites for oviposition.

L. J. Stannard, Jr., at the University of Illinois, who was actively engaged in a taxonomic study of this genus, verified my opinion that a new species was involved. A name for the species, *Periclista linea,* appeared subsequently (1949) in his monograph of Nearctic species in the genus. There follows a redescription of the adult.

[1] Contribution No. 874 from the Department of Entomology, University of Kansas.

Periclista linea Stannard

FEMALE. Length, 5.5 mm.; alar expanse, 12.3 mm. Robust, shiny black, densely pilose. Wings hyaline, nervures brown to black. *Head:* Black, covered with dense pile of short, black hairs, triangular in outline, posterior margin distinctly concave in dorsal aspect; eyes large, in frontal aspect extending from mandibular articulation to posterior ocelli; antennae stout, filiform, setiferous, scape bulbous apically, pedicel as broad as long, third segment longest, following segments decreasing in length; ocelli reddish, clypeus truncate, slightly indented medially on distal margin; labrum rounded truncate, white with apical margin yellowish; clypeus and labrum densely clothed with long, pale hairs; mandibles black, covered with black hairs; palpi pale amber. *Thorax:* Pilose, shiny black except caudolateral angles of pronotum which are white and large median lateral area of episternum which is dark honey-colored; pronotum constricted and tilted forward forming narrow collar on meson; tegulae and cenchri white; post tergite shiny black, well developed. *Abdomen:* Tergites black, shining, pilose, segments two through nine with narrow caudal margin white, this margin broadest on eighth tergite; first tergite divided on meson forming conspicuous inverted V; pleurites and sternites infuscate with lateral portions of sternites black; sheath rounded ventrally, straight dorsally, somewhat pointed apically, projecting beyond cerci. *Legs:* Blackish, pilose; coxae black except distal portion of anterior coxae which are infuscate; trochanters pale amber except anterior trochanter which is fuscous; femora dark brown, the hind femora with outer surface black; tibiae and tarsi dark brown; tarsal claws with narrow inner tooth parallel to, and two-thirds as long as, outer tooth. *Wings:* Hyaline, minutely setiferous; nervures black to brown; stigma brown; front wings with stub of second and third anal veins turned up at apex.

MALE. Length, 5.2 mm.; alar expanse, 10.7 mm. Color similar to female with following exceptions: Palpi infuscate; episternum entirely black, shining tegulae black except at apex; legs shiny black except outer portions of femora near apices, tibiae and tarsi which are brown; hind wings with peripheral vein present.

The above descriptions are from specimens in the author's collection, six females and twenty-five males, all collected at Berkeley, California, in February and March, 1948.

DISTRIBUTION. The writer has thus far seen specimens collected only in the vicinity of Berkeley, Alameda Co., California, and Tilden Regional Park, Contra Costa Co., California.

BEHAVIOR OF ADULTS

On warm sunny days in early spring adults of this species may be seen in great numbers in the oak covered canyons of the San Francisco Bay region. It is one of the first sawfly species to make its appearance in the spring. The males commonly congregate around live oaks and bay laurels, flying about the lower branches and alighting on leaves which are exposed to the sunshine. Frequent flights are made around the trees but the male sawfly has not been observed to enter among the branches, confining all of its contact with the trees to the peripheral branches and leaves. The males habitually

repose for extended periods on the upper surfaces of leaves bathed with direct sunlight, the only gross movements being a quivering of the antennae. They may walk around on leaves and twigs for short distances, but usually changes in position are accomplished by short or long flights. A swooping, to-and-fro flight is commonly used by males in approaching the spot selected for a landing.

Females do considerable wandering through the tree, often refraining from using their wings for long periods. Individuals have been watched for as long as fifteen minutes, during which time they moved about constantly, crawling along branches, out on leaves and buds, back onto branches and so forth. Always there is a search going on for suitable oviposition sites. Careful inspection of every leaf, twig and bud is made by the females, and they appear to be quite fastidious in their selection of a bud in which to oviposit. Except on rare occasions they have been observed to deposit eggs only in buds of a certain stage of maturity, buds which are destined to break in about one week. Many buds beyond this stage of growth are examined critically by the females, but very rarely is oviposition attempted.

When a suitable bud is found the female arches her abdomen and slides the ovipositor between the bud scales on the side of the bud opposite that over which the anterior part of the body reposes. Deposition of the egg requires one and one-half to two minutes' time.

On cold days adults of both sexes have been collected by beating oak trees. The sawflies when disturbed in this manner fall to the ground, assuming a posture of feigned death. The legs are then drawn up close to the body with the head tucked downward and abdomen curled forward. This position is also taken on by active adults whenever they are handled, a habit frequently encountered in many species of sawflies, particularly those of the Blennocampine group.

This species has been kept alive in rearing chambers in the adult stage for as long as seven days in the laboratory, males on all occasions being outlived by females. In captivity they readily feed upon honey water or plant exudates from injured succulent growth of oak, blackberry, ferns, asters and many other plants. Adult feeding was never positively observed in the field.

LIFE HISTORY

Periclista linea requires one year for the completion of its life cycle. In the San Francisco Bay region of California adult emergence occurs in February and March, the peak of the male population appearing to precede the period of maximum abundance of females by about two weeks. Collection records and personal observations of the writer indicate that this species is very abundant in this area.

EGG STAGE. The egg, as noted above, is deposited in dormant buds of *Q. agrifolia* about one week before the bud breaks and the bud scales are shed. Insertion is made in a random manner into the bud, the egg often not being inserted into tissues within, but frequently left in a pocket or fold between the young leaf and branch buds. Eggs when first laid are ovoid, opaque white, about 0.8 mm. long and 0.23 mm. in greatest diameter. The egg case stretches as the embryo grows, black eye spots and brownish mouth parts becoming

visible after forty-eight hours of incubation at a constant temperature of 72° F. The embryo rests in a curled position within the transparent egg case with the apex of the abdomen touching the mouth parts. During the two days immediately preceding emergence from the egg the developing em-

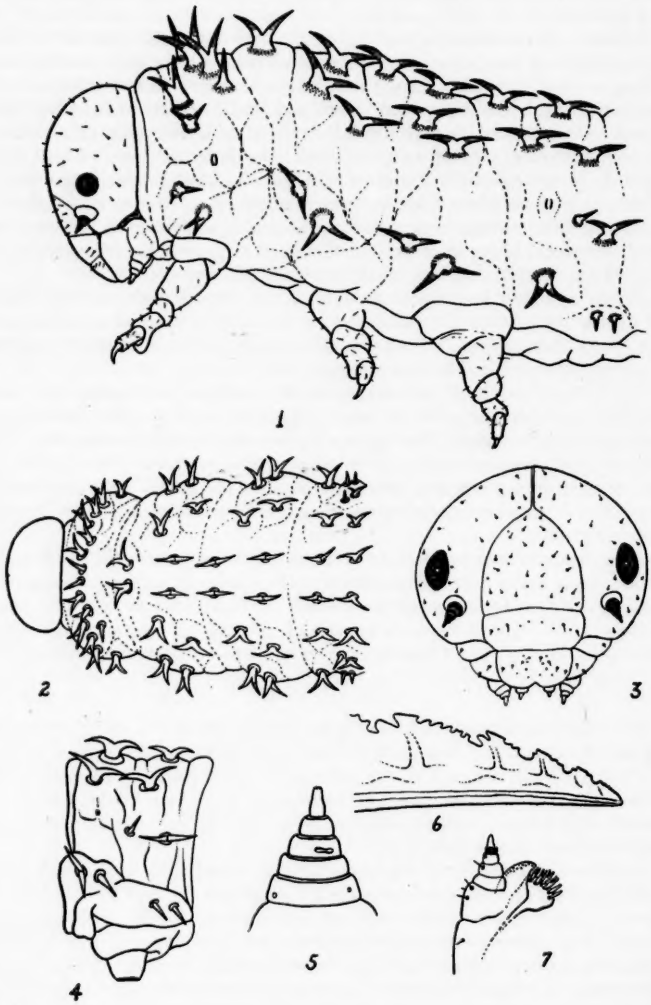


Plate I . . . *Periclista linea* Stannard.

Characters of fifth instar larva. 1. Lateral aspect of head, thorax and first abdominal segment. 2. Dorsal aspect of head, thorax and first abdominal segment, showing arrangement of spines. 3. Anterior aspect of head. 4. Third abdominal segment. 5. Antenna and antacoria. 7. Maxilla.

Characters of adult female: 6. Saw.

bryo moves about considerably. The egg case splits dorsally, about three-fourths of its length, and the first instar larva issues forth. At a constant temperature of approximately 72° F., the egg stage lasts five days.

LARVA.—*First instar*: Upon emergence from the egg the larva is 1.95 mm long; width of head capsule 0.35 mm. The body is transparent and covered with transparent, simple and bifurcate spines; head capsule pale amber with black ocellarae and ocularia. *Second instar*: Length, 3.5 mm; width of head capsule, 0.45 mm. Color pale green with spines slightly fuscous at tips; head

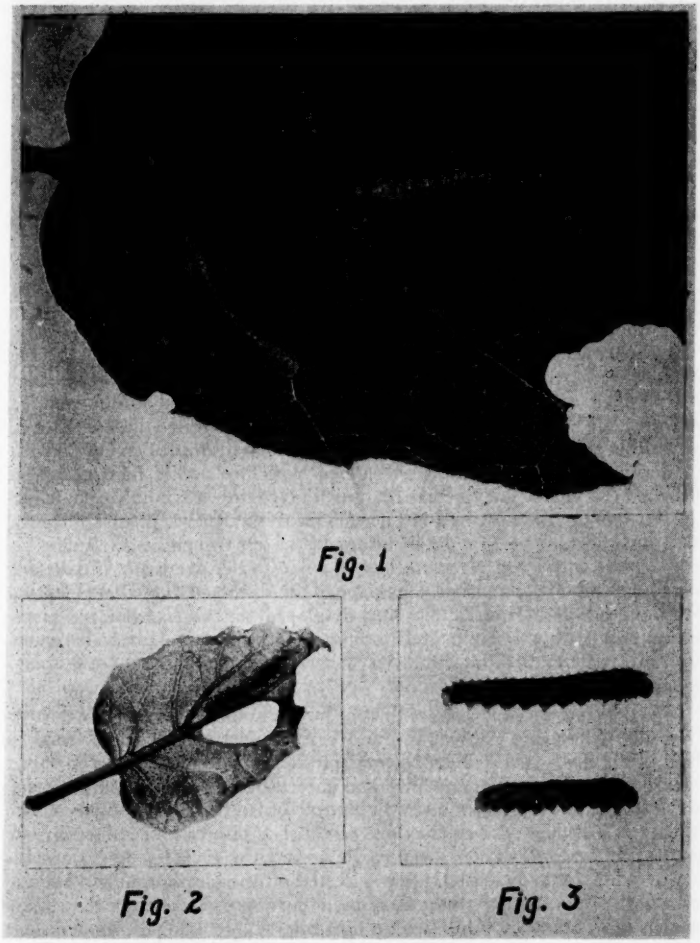


Plate II . . . *Periclista linea* Stannard.
1. Fifth instar larvae on leaf of host plant, *Quercus agrifolia*.
2. Fourth instar larva on oak leaf showing typical feeding damage.
3. Fifth and sixth instar larvae.

capsule amber, with or without dusky infuscation on front and vertex; ocellarae and ocularia black; mouth parts brownish. *Third instar*: Length, 6 mm; width of head capsule, 0.9 mm. Color the same as preceding instar but slightly darker green with tips and bases of spines black. *Fourth instar*: Length, 7.25 mm; width of head capsule, 1.1 mm. Color the same as preceding instar. Some larvae with fuscous areas on head capsule in previous instar have clear, pale amber head in this instar. *Fifth instar*: Length, 10 mm; width of head capsule, 1.15 mm. Color the same as preceding instar; body more robust. Some larvae with infuscate head capsule in previous instar have clear, amber-colored head capsule in this instar. *Sixth instar*: Length, 7.5 mm; width of head capsule, 1.2 mm. Color yellow with faint greenish tinge; head capsule opaque white, faintly greenish; body smooth, entirely devoid of spines. Ocellarae and ocularia black. Ultimate instar for both sexes.

The exuviae of all instars are cast following a splitting of the front along the epicranial suture and epicranial arm after which the body works itself forward through this opening, the old integument being anchored at the posterior end by a previous expulsion of a viscous, cement-like substance from the anal opening. The head capsule is the first portion of the body free from the exuviae, followed by the thoracic legs, thorax and abdomen in that sequence.

A detailed description of the fifth instar larva follows: Head capsule usually uniform amber-colored but may be variously infuscate, a great degree of variation being found among individuals in this respect; sparsely setiferous. Ocellarae and ocularia black. Antennae conical, fixe-segmented, opaque white. Front spade-shaped, pointed dorsally, with twenty-two stout setae. Clypeus truncate, with two prominent setae on each side. Labrum rounded truncate, distinctly involuted mesally forming an inverted U-shaped cleft, four stout setae on each side. Mandibles dark brown, quadridentate. Maxilla with five-segmented palpus, basal segment with two stout spines; galea flattened, both lateral and medial margins curved inward meeting at point; lacinia rounded apically, its margin armed with six or seven broad flat spines, the proximal ones being typically bifurcate, the last two entire.

Thorax with large, bifurcate, barbed spines which are black at their tips and bases; four of the forty thoracic spines are unforked, these being located on the prothorax. Thoracic legs well developed, normal in form, setiferous, tarsal claw with a single tooth. Prothoracic spiracles larger than abdominal spiracles, pale amber, indistinct, not winged. Spiracles absent on meso- and metathorax.

Abdomen with four distinct rows of bifurcate spines dorsally, three rows laterally. All spines black at tips and bases. Uppermost of lateral rows of spines slightly below line connecting spiracles and consisting of two spines per segment, the anterior one small and unforked, the posterior one bifurcate, both located on fourth annulet. Middle row of lateral spines consists of two spines per segment, the anterior one of which is bifurcate, the posterior one unforked, both on second annulet. The lower row of lateral spines consists of two unforked spines per segment located on the fourth annulet. Abdominal segments with five annulets, spines occurring on second and fourth annulets only. Spiracles minute, pale amber-colored, occurring on segments one

through eight inclusive. Uropods on segments two through eight inclusive and on segment ten.

The ultimate instar larva differs from the fifth instar larva described above in that the body is entirely smooth, being free of bristles, tubercles or other protuberances. Under high magnification, the integument is seen to be minutely, uniformly and shallowly pitted. No evidence is apparent on the body surface indicative of the former location of spines of the previous instar.

Although larvae are normally greenish in color in the fifth instar and yellowish-green in the ultimate stage, they fade to white when boiled and preserved in alcohol or when treated with preservatives such as KAAD or XAAD. If larvae are not boiled or treated with a preservative prior to storing in alcohol, they discolor to a dark brown; hence one of the above treatments is recommended.

BEHAVIOR OF LARVAE. Larvae upon hatching from the egg remain within the developing bud, the scales of which begin to drop off at about the time of hatching. Usually the larvae has attained the third instar before the leaves in the bud have expanded sufficiently to expose the insect. At this time they repose on the lower surface of the leaf with the mouth parts directed caudad, the prothorax almost entirely concealing the head capsule except when actively engaged in feeding. The body is stretched out flat against the leaf surface with the thoracic legs and uropods clining tenaciously to the leaf. In this position they are very difficult to dislodge and are reluctant to release their grasp even when irritated.

Larvae in the late fifth instar have a tendency to drop to the ground when disturbed, the normal practice being to do this just prior to the final ecdysis. Upon entering the ultimate instar the larva, after a brief period of resting during which the cuticle hardens, begins digging into the soil, disappearing in a matter of a few minutes. The soil is penetrated to a depth of one to two inches depending upon the texture of the substrate and a cocoon is constructed for aestivation, hibernation and ultimate pupation.

PUPA. The chamber in which pupation takes place is a small, parchment like, ovoid cocoon to which particles of dirt and debris adhere, 6 mm. long and 2.8 mm. in diameter. Within it the shriveled, yellowish-green ultimate larva reposes with thoracic legs closely appressed to the body. Aestivation and hibernation take place in this sixth larval instar, with the final larval molt occurring in late winter or very early spring. The pupa is semi-transparent for the first three days of development, with the dark pigmentation beginning in the thoracic region on the fourth day and continuing to expand over the body and its appendages through the tenth or eleventh day. The nearly black adult insect is then ready for emergence and after chewing an escape hole in the end of the cocoon digs through the earth to the ground surface.

It may be mentioned here that the author has taken larvae of four different species of *Periclista* from *Quercus agrifolia* on the Berkeley campus of the University of California. All these species can be differentiated easily on a basis of larval characters. Adults of two other species of *Periclista* have been taken from oak on the campus, but until further rearing studies are accomplished, association of adults with larvae will not be possible. None of the

species mentioned above (larvae or adults) has been identified as a named species.

SUMMARY OF LIFE CYCLE.—At a temperature maintained fairly constant at 72° F. the larvae develop very rapidly. The egg hatches in about five days. The first instar larva endures one or two days; second, third and fourth instars usually last one day each. The larva remains in the fifth instar for about three days and in the active phase of the ultimate instar for one day. The quiescent sixth instar remains enclosed in the thin, parchment-like cocoon in the soil for several months. No data are available on the longevity of adults.

HOST PLANTS

The preferred host appears to be *Quercus agrifolia* Nee. or *Quercus agrifolia* var. *frutescens* Engelm. Larvae have not been taken in the field from plants other than these, but in rearing chambers they have fed upon *Quercus borealis* Mich. and *Quercus alba* L. Feeding upon the latter two species appeared to be reluctant, however, for when foliage of the recognized host was introduced into the rearing chamber the other food material was abandoned in its favor.

NATURAL ENEMIES

Birds appear to be the greatest natural enemies of this species, particularly bush-tits and the plain titmouse, both of which abound in the Berkeley area. A single bush-tit has been seen carrying at least ten larvae of this sawfly in its beak. When flocks of these birds move through an oak they carry off countless numbers of larvae. The plain titmouse has also been seen feeding upon these larvae.

Arthropod predators actually seen by the author effecting their toll upon the population of *Periclista linea* include various species of spiders and various species of *Vespa* which have been seen devouring adults.

ECONOMIC IMPORTANCE AND CONTROL

This sawfly may be appended to the long list of insects known to be destructive to the coast live oak. The damage caused by heavy infestations of larvae is quite severe, consisting of destruction of foliage buds and consumption of leaves. Although population densities of the larvae of this species seldom reach the exceedingly destructive proportions of the California oak moth, *Phryganidia californica* Packard, for example, they often occur in sufficient numbers to warrant application of control measures.

Spraying with DDT is not effective, rates of one pound of actual material per one hundred gallons of water failing to affect larvae. Parathion has been tried with good results, peneration of buds by the material being sufficient to kill the larvae before or immediately after hatching. A wettable powder formulation used at the rate of one-fourth of a pound of actual parathion per one hundred gallons of water gave effective control. Lead arsenate sprays or dusts are also effective, but these will not kill young larvae before damage is inflicted upon young bud growth.

LITERATURE CITED

Stannard, L. J., 1949. The Nearctic species of the genus *Periclista*. Trans. Am. Ent. Soc., 75(1):7-42, pls. II-V.

A NEW SPECIES OF *MERRAGATA* (HEMIPTERA: HEBRIDAE) FROM MEXICO

T. WAYNE PORTER
Department of Zoology
Michigan State College, East Lansing

An undescribed species of *Merragata* was found in a recent collection of hebrids taken in Mexico by Doctor Fred S. Truxall for the Los Angeles County Museum.

Merragata truxali n. sp.

SIZE. Macropterous male; length, 1.70 mm. to 1.90 mm.; width across humeri, 0.74 mm. to 0.80 mm.; macropterous female, length, 1.90 mm. to 2.00 mm.; width across humeri, 0.80 mm. to 0.90 mm.

COLOR. Head fulvous to fuscous, compound eyes fuscous, ocelli ferreous, antennae fuscous, darker at joints; pronotum fusco-piceous to fuscous, lighter on disc, median portion of collar approximately same color as disc, scutellum fuscous to fusco-testaceous; hemelytra with distal ends and base of veins fuscous, median portion fusco-testaceous, membrane fuliginous, with or without four pale irregular areas on broad expanse, clavus and corium lighter than other membranous parts. Underparts: head with buccula fuscous to testaceous, rostrum fuscous, darker at apex, sternal ridges fuscous to testaceous, prosternum lighter than meso- and metasternum, legs testaceous, venter piceous, fusco-piceous, fuscescent or testaceous.

STRUCTURAL CHARACTERISTICS. Vertex of head with medial longitudinal sulcus containing two anastomosing rows of pits, frons slightly swollen, clypeus rounded, antennae four-segmented, scape with bulb, third and fourth segments with ring-joints, distal segment clavate, all segments approximately equal in length, distal segment broader than other segments, all segments with scattered setae; pronotum with collar punctate on posterior lateral border, with longitudinal medial sulcus on discs, sulcus deep anteriorly and evanescent on posterior disc, ridges of sulcus join collar, deep lateral depressions along anterior portion posterior to collar, two rows of pits in bottom of sulcus, humeri impressed within, row of punctures in impression, humeri prominent and angulate, discs of pronotum punctate and demarcated by depressions; scutellum with medial longitudinal carina, bifid or truncate at apex, lateral edges and apex upturned; hemelytra with inner vein produced at claval angle, membrane may or may not extend to tip of abdomen; connexivum turned upward; underparts, rostrum extends to middle of metasternum, sternal ridges prominent; parameres of male elongate with a lateral and dorsal protrusion, parameres of some specimens extend beyond tip of abdomen, long coarse setae on distal end of parameres extend beyond tip of abdomen in all specimens.

COMPARATIVE NOTES. Near *Merragata hebroides* B. White but may be separated from this species by the parameres of the males. The long coarse setae of the parameres of *M. truxali* n. sp. extend beyond the tip of the abdomen. This character is lacking in *M. hebroides* White. When dissected, the parameres of *M. truxali* are elongated, club-like, and have lateral and

dorsal protrusions. The parameres of *M. hebroides* are short, rounded, and shaped somewhat like the head of a bird.

Location of Types: Holotype male and allotype female in the Los Angeles County Museum. Paratypes: seven males and seven females, Cuchuhaqui River, 5 mi. S. of Alamos, Sonora, Mexico, 8/6/53, F. S. Truxal. Paratypes in the Los Angeles County Museum and collection of the author. Type locality, Cuchuhaqui River, 5 miles South of Alamos, Sonora, Mexico.

There were no brachypterous forms in this series.

It would seem advisable to further clarify the following statement quoted from "A New Tropical Hebrid" by Carl J. Drake: "An examination of the type of *M. slossoni* Van Duzee in the California academy of Sciences shows this species to be a synonym of *M. hebroides* B.-White. (*new synonymy*)", Pan-Pac. Ent., XXV:194, 1952. I wish to quote from my unpublished Ph.D. thesis, "Taxonomy of the American Hebridae and the Natural History of Selected Species, 1950", on file at the University of Kansas. The following is taken from pages 58-59: "I have examined the type of *M. slossoni* Van Duzee and discovered it to be a female instead of a male. The genital armature was covered with glue. Upon removal of this material the error in sexing became apparent. The characters which Van Duzee, in his original description, ascribed to the species were found but they are not unique. There is considerable variation in the species and the characters on which Van Duzee relied for distinguishing *M. hebroides* from *M. slossoni* are variations which occur in *M. hebroides* White."

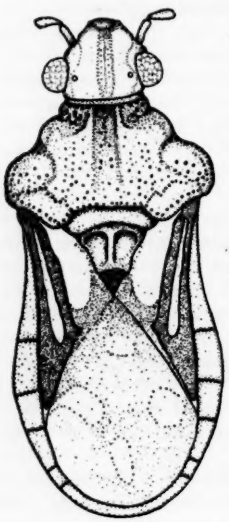


FIG. 1

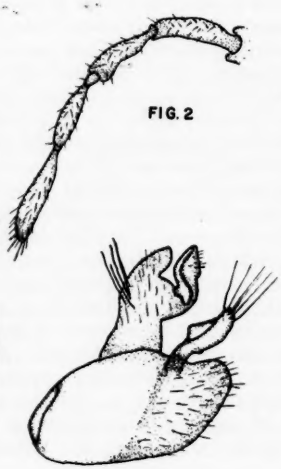


FIG. 2

FIG. 3

FIG. 4

EXPLANATION OF ILLUSTRATIONS

Figure 1. *Merragata truxali* n. sp.
Figure 2. Antenna of *M. truxali* n. sp.
Figure 3. Genital capsule of *M. truxali* n. sp.
Figure 4. Lateral view of male paramere.

A REVISION OF THE GENUS *MEGAMELUS* IN AMERICA NORTH OF MEXICO (Homoptera, Fulgoridae, Delphacinae)[1, 2]

R. H. BEAMER

Megamelus Fieber

Haplotype: *Delphax notula* Fieber, 1866, Verh. Zool. Bot. Ges. Wien 16:519.

This genus is characterized by a narrow head, a long, narrow crown extending in front of the eyes and especially by the lobed appearance of the ninth segment of the male abdomen. This later is diagnostic for this genus. The type is the European species, *Megamelus notulus* Fieber, and as such is considered in this paper.

Megamelus davisi VanDuzee

Megamelus davisi VanDuzee, 1897, Bull. Buffalo Soc. Nat. Sci. p. 235.
Megamelus angulatus Osborn, 1903, Ohio Naturalist 5:373.

BRACHYPTEROUS FORM: Resembles *Megamelus paleatus* (VanDuzee) but almost brown in color, anal segment with processes and aedeagus flat with narrow twisted apex. Length ♂ 3.2 mm., ♀ 3.8 mm. Clavus of elytra almost black.

Structure: Antennal segments about equal in length; crown more than twice as long as apical width, projecting in front of eyes more than one-third its length, carinae very pronounced; elytra longer than wide, apices broadly rounded; calcar about as long as first segment of tarsi, broad.

Color: General ground color dark brown, lobes of ninth segment of male black, apices of carinae, veins of elytra, pustules of abdomen usually lighter.

Genitalia: Genital capsule in ventro-caudal view with outer lobes of ninth segment kidney-shaped; median lobes widest at base, narrowed on caudal half to sharp apices; styles with outer margin narrowed and rounded at apices to recurved points on inner margin; aedeagal brace broadly rounded anal segment with two sinuate caudally projected processes, about as long as sides of segment.

Types: 6 ♂ ♂ and 1 ♀ Michigan, Davis, June. Lectotype ♂ designated by Oman, 1947, Iowa State Jour. of Sci. 21(2):215.

Material at hand from Tennessee, New Jersey, Missouri, Illinois, Kansas, Washington, D.C., and Florida.

The material from New Jersey was collected by F. M. Uhler, July 21, 1942, from the leaves of *Castalia odorata* with the following note, "They destroyed the leaves of this plant throughout the entire growing season."

The only cotype male of *angulatus* was dissected Jan. 29, 1952, and found to be identical with *M. davisi*.

---

[1] Contribution No. 842 from the Department of Entomology, University of Kansas.

[2] The illustrations were prepared with the aid of a grant from the General Research Funds of the University of Kansas. I wish to acknowledge the aid of Mr. E. B. Wittlake in the preparation of these illustrations.

Megamelus lunatus n. sp.

BRACHYPTEROUS FORM. Resembling *Megamelus flavus* Crawf. but aedeagal brace with excavation more nearly truncate, tips of arms of brace not nearly so sharply pointed and scarcely directed ventrally.

Structure: Basal antennal segment distinctly shorter than the second; crown about twice as long as apical width; carinae distinct but not too high and sharp; elytra reaching to second abdominal segment, apices truncate.

Color: General color quite dark brown with a median longitudinal light stripe.

Genitalia: Genital capsule in ventral view with outer lobes of ninth segment about half as long as capsule, inner lobes more than half as long as outer, widest at base, apical half more than half as wide as base, apices rounded with a rather heavy peg between their bases; styles widest on basal half, sharply narrowed on inner margin near middle to half basal width, enlarged again on apices; outer point angular, inner more or less rounded; aedeagus very long and curved both near base and apex, with numerous retrorse serrations near middle, aedeagal brace deeply excavated with almost flat bottom, apices slightly bent ventrally; anal segment with a large pair of curved processes extending anteriorly.

Types: Holotype male, allotype female and one female paratype: South Dayton, New York, July 23, 1946, L. D. Beamer; other paratypes: 4 ♀ ♀ same place and date, R. H. Beamer, 1 ♂ Ashford, New York, July 22, 1946, L. D. Beamer; 1 ♂ Lake Placid, New York, July 23, 1946, R. H. Beamer.

MACROPTEROUS FORM. Like the brachypterous form except with long flight wings.

Types: Holomorphotype ♂, allomorphotype ♀, and one ♂ paramorphotype Ashford, New York, July 22, 1946, R. H. Beamer; other paramorphotypes: 1 ♂ same place and time, L. D. Beamer, 2 ♂ ♂ Douglas Co., July, 1939, P. B. Lawson, 1 ♀ South Dayton, New York, July 23, 1946, L. D. Beamer.

Types in the Snow Entomological Museum.

Megamelus notulus (Germar)

Delphax notula Germar, 1830, Thon. Ent. Archiv. 2:57.

BRACHYPTEROUS FORM. This species is treated here because it is the type of this genus. The specimen used is from Sweden, collected and determined by Frej Ossiannilsson.

Structure: First segment of antennae almost as long as second; vertex slightly more than twice as long as apical width, projects in front of eyes not quite one-third its length; carinae strongly marked but not as high and sharp as some; elytra slightly longer than wide, apices nearly truncate with rounded corners; calcar almost as long as first tarsal segment, not much wider.

Color: General ground color light, lateral fovea of crown and broad stripe on each side of dorsum dark brown.

Genitalia: Genital capsule in caudo-ventral view with lateral lobes of ninth segment large, kidney-shaped, second pair of lobes about one-half as long as outer, narrow, about one eighth as wide, with a short sharp spine between their bases; styles widest on basal third, inner margin sharply excavated near middle, apices enlarged with a knob-shaped inner and angular outer corner;

aedeagal brace U-shaped with apices sharp and curved ventroanteriorly; anal segment with a pair of recurved sharp spines; aedeagus long, covered with many short, sharp, retrorse serrations in middle region and a sword-shaped process near base about one third as long as shaft.

Specimens at hand, 3 ♂ ♂ and 1 ♀ Bohemia, and 2 ♂ ♂ Sweden.

Megamelus flavus Crawford

Megamelus notulus flavus Crawford, 1914, Proc. U. S. Natl. Mus. 46:609.
Megamelus uncus Metcalf, 1923, Jour. Elisha Mitchell Sci. Soc. 38:204.
Megamelus anticostus Metcalf, 1923, Jour. Elisha Mitchell Sci. Soc. 38:204.

BRACHYPTEROUS FORM. Resembles *Megamelus notulus* (Germar) but may be separated from it by inner lobes of ninth segment of male having much sharper apical inner corners and by aedeagus without basal sword-shaped process. Length ♂ 3 mm.

Structure: First segment of antennae slightly shorter than second; crown about twice as long as apical width, projecting one-fourth its length in front of eyes, carinae distinct; elytra almost as broad as long, apices truncate.

Color: General color stramineous with a rather broad dorsal median white stripe over head and pronotum and a lateral brown vitta along outside of elytra and dorsum of abdomen; lobes of genitalia almost black.

Genitalia: Genital capsule in caudoventral view with outer lobes of ninth segment large, kidney-shaped, almost half as long as entire capsule; inner lobes narrow, about half as long as outer, inner corner of apices very sharp; a small peg-like projection midway between their bases; aedeagal brace deeply excavated, apices sharp, bent ventrally at points; aedeagus very long, covered with short, sharp, retrorse serrations, base without sword-shaped process; anal segment with a pair of very slender, sharp, retrorse curved processes.

Types: The type series in the United States National Museum was examined, one of the males cleared and studied. Other specimens from Grand Lake, Colorado and from Alaska were at hand.

The types of *M. uncus* Metcalf and *M. anticostus* Metcalf taken by the same man on the same day on Ellis Bay, Anticosti, Quebec, were examined August 29, 1952, and found to be identical and both the same as *Megamelus flavus* Crawford. The holotypes of these species are in the Museum of Comparative Zoology at Harvard.

Megamelus aestus Metcalf

Megamelus aestus Metcalf, 1923, Jour. Elisha Mitchell Sci. Soc. 38:202.

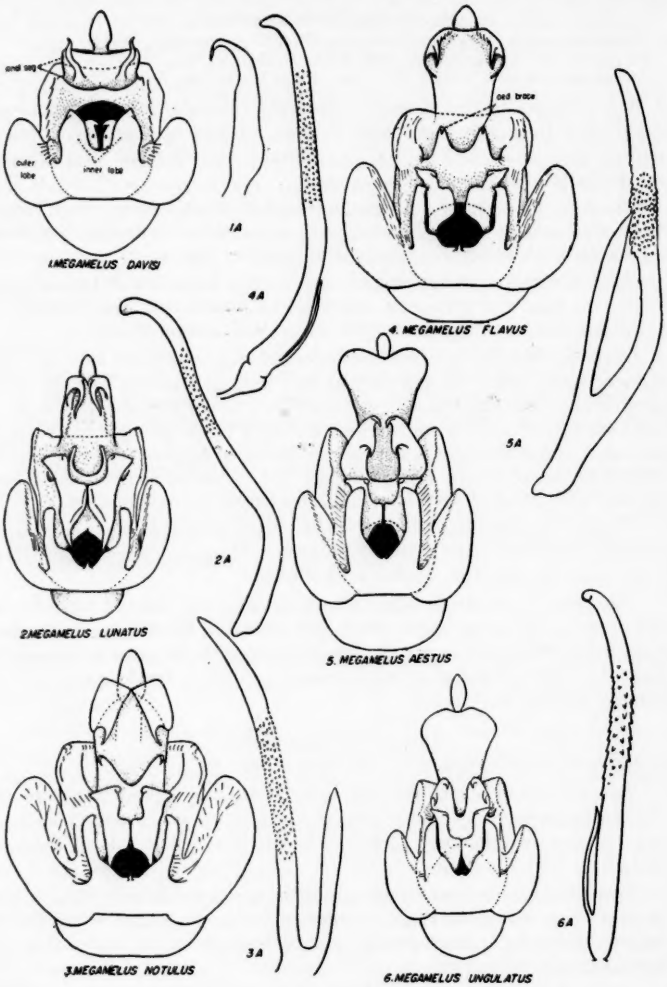
BRACHYPTEROUS FORM. Resembling *M. flavus* but without hooks on anal segment, with two recurved hooks on inside of each side of aedeagal brace and with a large sword-shaped process near base on ventral side of aedeagus. Length ♂ 3mm., ♀ 4 mm.

Structure: Crown about twice as long as apical width, projecting in front of eyes about one-third length, carinae evident, not sharp; elytra slightly longer than wide, apices truncate, corners rounded; calcar shorter than first tarsal segment, fairly wide.

Color: General color flavous with a lighter median stripe; a broad lateral

stripe on each side of dorsum and two more or less longitudinal uneven stripes on elytra, dark brown, ventral lobes of ninth segment light brown.

Genitalia: Genital capsule in caudoventral view with outer lobes of ninth segment at least one-third as long as capsule, rather sharp at apices; inner pair of lobes almost as long as outer, widest at base, remainder about one-third as



wide as outer, inner margins slightly longer than outer, short sharp spine between bases; styles widest at base, sharply narrowed on inner margin near middle, apices enlarged with rounded knob on inner point and sharpened point on outer; aedeagal brace deeply excavated into about two equal parts with a pair of retrorse spines on inner margin of each portion; aedeagus long and slender with midportion covered with numerous short retrorse serrations and a sword-shaped process arising at base on ventral margin, a little more than half as long as shaft.

Holotype ♂, in collection of Z. P. Metcalf, examined. Other specimens examined: 3 ♂ ♂ and 1 ♀ from New Hampshire in the Snow Entomological Museum.

Megamelus ungulatus n.sp.

BRACHYPTEROUS FORM. Resembling *M. bispinosus* except that retrorse spines of aedeagal brace are on the outer instead of inner margin. Length ♂ 3 mm., ♀ 3.5 mm.

Structure: Vertex a little more than twice as long as apical width, extending about one-third its length in front of eyes, carinae distinct and sharp; elytra nearly square, apices truncate, corners rounded.

Color: General ground color yellowish brown, broad median longitudinal stripe lighter, a broad lateral stripe on each side of dorsum including most of elytra quite dark; outer lobes of ninth segment golden yellow.

Genitalia: Genital capsule in caudoventral view with outer lobes of ninth segment about one-fourth length of capsule; inner lobes two-thirds as long as outer, widest at base, outer half narrowed to about one-third width of outer, with small sharp tooth between their bases; styles widest at base, narrowed sharply on inner margin near middle to half basal width, angularly extended on outer apical corner; aedeagal brace deeply excavated on middle third, each side with two recurved sharp spines on outer margin; aedeagus long and narrow, curved ventrally on outer half, middle portion covered with somewhat larger recurved serrations; a slender process on ventral margin near base about one-third as long as shaft.

Types: Holotype ♂, allotype ♀, 12 ♂ and 18 ♀ paratypes, Storrs, Connecticut, August, 1946, R. H. Beamer; other paratypes: 5 ♂ ♂ and 1 ♀ Storrs, Connecticut, August 29, 1946, R. H. Beamer; 1 ♂ Nelson, North Carolina, August 31, 1946, R. H. Beamer; 4 ♂ ♂ Chapel Hill, North Carolina, August 31, 1946, R. H. & L. D. Beamer.

PLATE I

1. *Megamelus davisi,* ventral view of genital capsule of male; anal. seg.—anal segment showing asymetrical processes. s-styles, inner lobes and outer lobes; la, lateral view of aedeagus, enlarged.
2. *Megamelus lunatus,* ventral view of genital capsule of male; 2a, lateral view of aedeagus, enlarged.
3. *Megamelus notulus,* ventral view of genital capsule of male; 3a, lateral view of aedeagus, enlarged.
4. *Megamelus flavus,* ventral view of ganital capsule of male; 4a, lateral view of aedeagus, enlarged.
5. *Megamelus aestus,* ventral view of genital capsule of male; 5a, lateral view of aedeagus, enlarged.
6. *Megamelus ungulatus;* ventral view of genital capsule of male; 6a, lateral view of aedeagus, enlarged.

Types in the Snow Entomological Museum.

Megamelus bifidus n.sp.

BRACHYPTEROUS FORM. Resembling *Megamelus bispinosus* Beamer but sides of division in aedeagal brace almost contiguous and without processes. Length ♂ 3 mm., ♀ 4 mm.

Structure: Crown about two and one-half times as long as width at apex, projecting one-third its length in front of eyes, carinae distinct, fairly sharp; elytra about as wide as long with apices truncate; dorsum of abdomen with pustules more or less in five rows.

Color: Generally dark with broad median dorsal stripe light; basal third of elytra semihyaline, margin of posterior corners white; venter generally much lighter.

Genitalia: Genital capsule in caudoventral view with outer lobes of ninth segment almost one-fourth as long as capsule, inner pair about half as long as outer, separated at base by their own length, inner margin on basal third deeply incised, short heavy tooth between their bases; styles widest on basal third, inner margins gradually narrowed on apical two-thirds to truncate apices; aedeagal brace medianly split on apical half, two portions contiguous on basal two-thirds, caudal half very narrow; aedeagus very long and slender, apex slightly bent ventrally; anal segment without processes.

Types: Holotype ♂, allotype ♀, 4 ♂ and 12 ♀ paratypes: Douglas County, Kansas, October 26, 1944, R. H. Beamer; other paratypes: 1 ♂ Douglas County, Kansas, June 9, 1944; 4 ♂ ♂ and 5 ♀ ♀ Douglas County, Kansas, November 2, 1944, R. H. Beamer; 3 ♂ ♂ and 11 ♀ ♀ Douglas County, Kansas, September 26, 1944, R. H. Beamer; 3 ♂ ♂ and 4 ♀ ♀ Douglas County, Kansas, August 9, 1944, R. H. Beamer; 1 ♂ La Cygene, Kansas, October 28, 1945, R. H. Beamer; 2 ♂ ♂ and 7 ♀ ♀ Ithaca, New York, July 25, 1946, R. H. Beamer; 16 ♂ ♂ and 9 ♀ ♀ Ashford, New York, July 22, 1946, R. H. Beamer; 8 ♂ ♂ and 1 ♀ Ashford, New York, July 22, 1946, L. D. Beamer.

Types in the Snow Entomological Museum.

Megamelus recurvatus n.sp.

BRACHYPTEROUS FORM. Resembling *Megamelus gracilis* but sides of aedeagal brace retrorse on outer third and aedeagus with short stout process on basal half. Length ♂ 3 mm.

Structure: First segment of antennae slightly more than two-thirds as long as second; crown rather broad, extending in front of eyes about one-fourth its length, sharply carinate.

Color: General color dark amber with median longitudinal light stripe.

Genitalia: Genital capsule in ventral view without processes on anal segment; lateral lobes of ninth segment about one-half as long as capsule, inner lobes half as long as outer and about one-third as wide not counting their bases, with a short peg between their bases; aedeagal brace broadly excavated to base, sides of brace sharply narrowed on outer third, abruptly recurved; aedeagus long, slender, with a short, strong, ventral process near basal third,

about median fourth of shaft covered with small, sharp, retrorse serrations.

Holotype ♂, Swan River, Manitoba, Canada, August 2, 1937, R. H. Beamer. In the Snow Entomological Museum.

Megamelus gracilis n.sp.

MACROPTEROUS FORM. Resembling *M. paleatus* but definitely smaller, aedeagus a long slender curved shaft instead of a short tubular one, also aedeagal brace divided to base into sharp pointed incurving parts. Length ♂ 4 mm., ♀ 5 mm.

Structure: First segment of antennae slightly shorter than second, crown almost 4 times as long as apical width, projecting in front of eyes slightly more than one-third total length, carinae very high and sharp.

Color: General ground color straw-yellow with apices of carinae, antennae, and venter, except an arcuate mark across body in region of clypellus, lighter.

Genitalia: Genital capsule in ventrocaudal view with lateral lobes of ninth segment about one-third as long as capsule, kidney-shaped, narrowest at caudal end; inner lobes about one-third as long as outer, twice as wide at base as at apex, narrowed on inner margin; styles widest on basal half, narrowed on inner margin to truncate apices; aedeagal brace excavated on middle to base, arms narrowed and incurved to sharp almost touching apices; aedeagus long and slender, outer third gently curved ventrally, near middle with 25-30 retrorse medium sized serrations; anal segment without processes.

Types: Holotype ♂, allotype ♀, and 1 ♂ paratype: Old Town, Florida, July 11, 1939, R. H. Beamer; other paratypes: 14 ♂♂ and 1 ♀ Sebring, Florida, June 20, 1951, Price, Beamers and Wood; 3 ♂♂ and 1 ♀ Homestead, Florida, June 22, 1951, Price, Beamers and Wood; 2 ♂♂ Sanford, Florida, July 11, 1951, Price, Beamers, and Wood; 2 ♂♂ and 1 ♀ Sanford, Florida, June 12, 1923, C. O. Bare; 1 ♀ Sanford, Florida, August 4, 1930, Paul W. Oman; 2 ♂♂ Royal Palm Park, Florida, July 22, 1948, E. L. Todd; 3 ♂♂ Royal Palm Park, Florida, July 21, 1948, R. H. Beamer; 1 ♀ Lachoochee, Florida, July 7, 1948, R. H. Beamer; 1 ♀ Morrison Field, Florida, West Palm Beach, Florida, September 3, 1942, D. Elmo Hardy; 1 ♂ Jacksonville, Florida, November, 1932; 1 ♀ Paradise Key, Florida, February 21, 1919, Schwartz and Barber; 1 ♂ Oldtown, Florida, July 11, 1939, P. W. Oman; 1 ♂ LaBelle, Florida, July 16, 1939, P. B. Lawson; 1 ♂ Oleno State Park, Florida, June 16, 1951, Price, Beamers and Wood; 2 ♂♂ and 3 ♀♀ Otter Creek, Florida, March 9, 1947, R. H. Beamer.

Types and paratypes in the Snow Entomological Museum; paratypes in the United States National Museum.

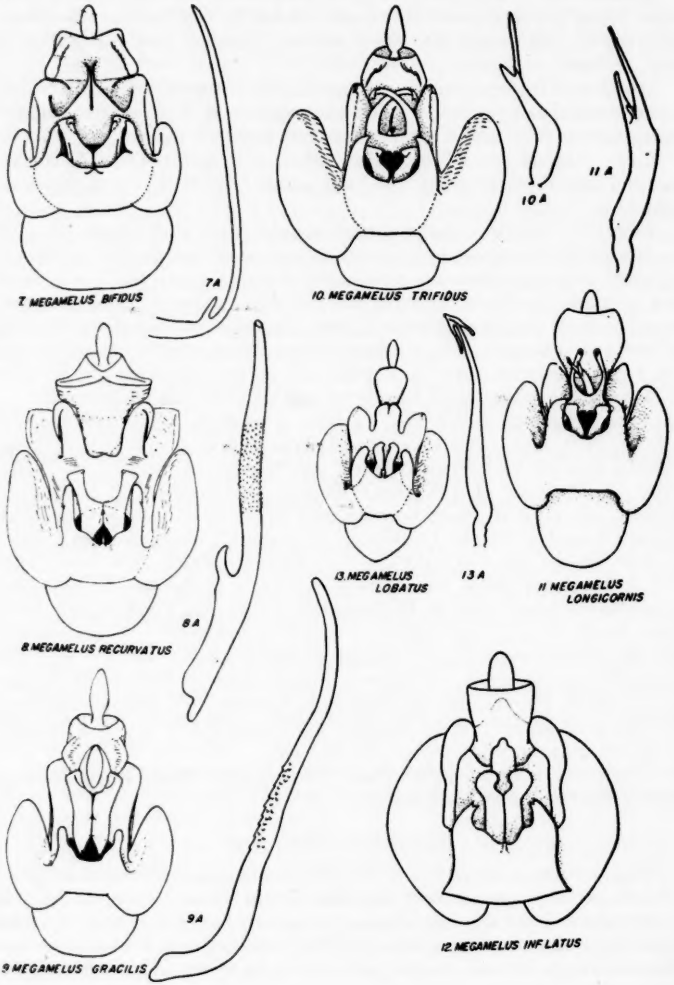
Megamelus trifidus n.sp.

BRACHYPTEROUS FORM. Resembling *Megamelus gracilis* Beamer but arms of aedeagal brace tapered very little and bifid at apices. Length ♂ 3.2 mm.

Structure: Basal segment of antenna slightly shorter than second; crown about three times as long as apical width, projecting a little more than one-third its length in front of eyes; carinae very high and sharp; elytra slightly longer than wide, apices truncate.

Color: General ground color mostly brownish, mottled with lighter especially on middorsal line.

Genitalia: Genital capsule in ventral view with outer lobes of ninth segment large, about half as long as capsule; inner lobes small, not half as long as outer, narrowed to fairly sharp apices on inner margin, basally separated



by about their own length with small sharp peg on margin of base; styles narrowed on inner margin of outer third, widened again on inner margin and more so on outer; aedeagal brace broadly excavated to truncate bottom, arms ribbon-like, slightly narrowed on basal third, curving in to cross, ending in bifid apices; aedeagus short and heavy, bent on basal third, ending in a trifid apex; anal segment without processes.

Types: Holotype ♂ and 1 ♂ paratype, Yankeetown, Florida, March 9, 1947, R. H. Beamer; other paratypes: 14 ♂ ♂ Cedar Keys, Florida, March 8, 1947, R. H. Beamer.

Types and paratypes in the Snow Entomological Museum.

Megamelus longicornis (Dozier)

Stenocranus longicornis Dozier, 1922, Ohio Jour. Sci., p. 76.

MACROPTEROUS FORM. Resembling *M. paleatus* VanDuzee in size but aedeagus flat with a trifid tip instead of short tubular with a sinuate process at apex.

Structure: First segment of antennae barely shorter than second; vertex narrow and long, projecting almost one-third its length in front of eyes, sharply carinate.

Color: General color dark brown, median dorsal line light on pronotum, veins of elytra quite dark, margined with fuscous.

Genitalia: Genital capsule in ventral view with outer lobes of ninth segment almost half as long as capsule; inner lobes narrow, about half as long as outer, apices pointed on inside, rounded on outside; aedeagal brace excavated almost to base, with margins widely separated, slightly narrowing on outer half with apices sharply pointed and extreme apex recurved; aedeagus of medium length, flat with apex trifid; anal segment without processes.

The holotype, according to word from Doctor Dozier's son, has been destroyed. Accordingly, the specimen described above is here designated neotype. It was collected at Covington, Louisiana, June 23, 1948, E. L. Todd. Other specimens, 5 ♂ ♂ and 3 ♀ ♀ (with the following data: Port Arthur, Texas, 10-20-V.E.D. Parmer) have been examined. Neotype in the Snow Entomological Museum.

PLATE II

7. *Megamelus bifidus,* ventral view of genital capsule of male; 7a, lateral view of aedeagus, enlarged.
8. *Megamelus recurvatus,* ventral view of genital capsule of male; 8a, lateral view of aedeagus, enlarged.
9. *Megamelus gracilis,* ventral view of genital capsule of male; 9a, lateral view of aedeagus, enlarged.
10. *Megamelus trifidus,* ventral view of genital capsule of male; 10a, lateral view of aedeagus, enlarged.
11. *Megamelus longicornis,* ventral view of genital capsule of male; 11a, lateral view of aedaegus, enlarged.
12. *Megamelus inflatus,* ventral view of genital capsule of male from illustration by Z. P. Metcalf, with his permisson.
13. *Megamelus lobatus,* ventral view of genital capsule of male; 13a, lateral view of aedeagus enlarged.

Megamelus inflatus Metcalf

Megamelus inflatus Metcalf, 1923, Jour. Elisha Mitchell Sci. Soc. 38:203.

No specimens of this species are at hand for study. The following is the original description. "This species may be recognized by its almost uniform pale yellow color with the pygofer of the male strongly inflated, genital hooks united into a single obtuse process.

"Vertex rather broad, strongly produced; frons narrowed between the eyes, broadened apically, the median frontal carinae forming a distinct callosity at the apex of the head; antennae long; first segment almost as long as the second, pronotum elongate, with a distinct impressed point either side of the median carina; intermediate carinae strongly divergent, reaching the posterior border; mesonotum about as long as the pronotum; calcars small; less than half as long as the basal segment of the tarsus; male pygofer strongly inflated; genital plates flat, incurved at the apex with a small median tooth between; genital styles short, about half as long as the genital plates, obtuse at the apex; genital hooks united on the median line then produced into an elongate obtuse process; anal segment short, anal processes not produced.

"*Color:* General color pale yellow, the frons, antennae and eyes and the lateral margins of the abdomen a little darker.

"Length, apex of head to apex of abdomen, 2.10 mm.

"Holotype ♂ Mill Neck, New York, June 19, N. Banks. In the collection of the Museum of Comparative Zoology. Paratype ♂, Mill Neck, New York, June 19, N. Banks.

"This distinct little species has evidently been confused in the past with *Megamelus notulus* but the male genitalia are entirely distinct."

The accompanying drawing was made with the permission of Dr. Metcalf from an illustration in his paper "The Redescription of Twenty-One Species of Areopidae Described in 1923," Jour. of the Elisha Mitchell Sci. Soc., 65: 48-60, 1949.

From Doctor Metcalf's illustration the bifid apex of the inner lobes on the ninth segment is the outstanding difference separating this species from closely related ones.

Megamelus lobatus n.sp.

BRACHYPTEROUS FORM: Resembling *M. falcatus* but largest process on apex of aedeagus not several times larger than smaller process. Length ♂ 3mm. ♀ 3.5mm.

Structure: Second segment of antennae longer than basal; crown about twice as long as apical width, carinae distinct but not sharp; elytra about as wide as long, apices truncate.

Color: General color stramineous with longitudinal stripe either side of dorsum very dark brown, lobes of ninth segment yellow.

Genitalia: Genital capsule in ventral view with outer lobes of ninth segment almost half as long as capsule, inner pair scarcely half as long as outer, more than twice as wide at base as at rounded incurved apices, a third pair of lobes one either side of aedeagal brace and almost as large; styles almost parallel-sided, narrowed on outer margin to rounded outed corner with beak-shaped inner corner; aedeagal brace spatulate, barest indication of median

excavation, lateral margins more or less serrate; aedeagus long and slender, curved ventrally with a pair of processes at apex; anal segment without processes.

Types: Holotype ♂, allotype ♀, 12 ♂ ♂ and 8 ♀ ♀ paratypes, Cedar Keys, Florida, March 3, 1947, L. D. and R. H. Beamer; other paratypes: 3 ♂ ♂ and 2 ♀ ♀, Slidell, Louisiana, March 3, 1947, R. H. Beamer; 3 ♂ ♂ Slidell, Louisiana, June 23, 1948, R. H. Beamer; 4 ♂ ♂ and 9 ♀ ♀ Arkansas Pass, Texas, January 2, 1946, R. H. Beamer; 2 ♂ ♂ and 4 ♀ ♀ Durham, New Hampshire, August 12, 1946, R. H. Beamer; 5 ♂ ♂ and 7 ♀ ♀ Yankeetown, Florida, March 9, 1947, L. D. and R. H. Beamer; 3 ♂ ♂ and 4 ♀ ♀ Mystic, Connecticut, August 8, 1946, R. H. Beamer; 8 ♂ ♂ and 11 ♀ ♀ Norwich, Connecticut, August 6, 1946, R. H. Beamer; 19 ♂ ♂ and 10 ♀ ♀ Piny Point, Maryland, August 26, 1946, R. H. Beamer; 5 ♂ ♂ and 5 ♀ ♀ same place and date, R. I. Sailer; 4 ♂ ♂ and 2 ♀ ♀ 17 miles south of Homestead, Florida, March 14, 1947 R. H. Beamer; one pair, Sanford, Florida, March 11, 1947, R. H. Beamer.

Types and paratypes in Snow Entomological Museum. Paratypes in United States National Museum.

MACROPTEROUS FORM. Like the brachypterous form but with flight wings. Length ♂ 3.5 mm., ♀ 4 mm. Elytra milky colored except fuscous spot near apex of clavus.

Types: Holomorphotype ♂, allomorphotype ♀, 2 ♂ ♂ and 1 ♀ paramorphotypes, Cocoanut Grove, Florida, August 9, 1930, J. O. Nottingham; other paramorphotypes: 4 ♀ ♀ same place and time as types, R. H. Beamer; 1 ♂ 17 miles south of Homestead, Florida, March 14, 1947, R. H. Beamer; 1 ♀ Yankeetown, Florida, July 31, 1930, Paul W. Oman; 1 ♀ Plant City, Florida, July 14, 1939, R. H. Beamer; 2 ♂ ♂ South Amboy, New Jersey, August 15; 1 ♂ Palatka, Florida, December 24, 1950, R. H. Beamer; 1 ♂ Fort Pierce, Florida, August 7, 1930, Paul W. Oman; 1 ♂ Kingsland, Georgia, July 12, 1951, Price, Beamers, Wood; 1 ♂ Snead, Florida, June 15, 1951, Price, Beamers, Wood; 3 ♂ ♂ Sebring, Florida, June 20, 1951, Price, 1951, Price, Beamers, Wood; 4 ♂ ♂ Ft. Myers, Florida, June 21, 1951, Price, Beamers, Wood; 1 ♂, Lake Placid, Florida, July 12, 1948, E. L. Todd; 1 ♂ Royal Palm Park, Florida, July 21, 1948, R. H. Beamer; 3 ♂ ♂ Sanford, Florida, C. O. Bare; 1 ♂ Suwanee Springs, Florida, August 2, 1939, D. E. Hardy; 2 ♂ ♂ Biloxi, Mississippi, June 25, 1948, R. H. Beamer; 1 ♂ Buras, Louisiana, June 21, 1948, R. H. Beamer.

Types and paramorphotypes in Snow Entomological Museum; paramorphotypes in the United States National Museum.

Megamelus falcatus n.sp.

BRACHYPTEROUS FORM. Resembling *Megamelus palaetus* (VanDuzee) but margins of elytra without white markings, crown much shorter and narrower and aedeagus with two apical processes one of which is broad and sickle-shaped. Length ♂ 3 mm., ♀ 3.2 mm.

Structure: First segment of antennae about half as long as second. Crown not quite twice as long as apical width, carinae evident but not sharp. Elytra with apices truncate, corners rounded, slightly longer than greatest width.

Color: General color amber, darker spot near apex of clavus and about lateral half of dorsum of abdomen often darker.

Genitalia: Genital capsule in caudoventral view with outer lobes of ninth segment semicircular in outline, inner lobes about as wide as long, separated by their own width with a short broad tooth midway between their bases, caudal lateral lobes long and narrow; styles widest at base, sides parallel to outer third where they narrow on inner margin to about one sixth basal width, turned in at right angles; aedeagal brace more or less rectangular, apex slightly narrower than base, slightly concave; aedeagus long and narrow with two asymmetrical processes at apex, one short and narrow, the other broad at base and twice as long; anal segment with a pair of very short, sharp caudoventral processes.

Types: Holotype ♂, allotype ♀, 3 ♂ and 3 ♀ paratypes, Danbury, New Hampshire, August 12, 1946, R. H. Beamer; other paratypes: 2 ♂ ♂ and 3 ♀ ♀ Canaan, New Hampshire, August 11, 1946, R. H. Beamer; 2 ♂ ♂ Storrs, Connecticut, August 2, 1946, R. H. Beamer; 1 ♂ and 1 ♀ Lake Placid, New York, July 30, 1946, R. H. Beamer. Types in the Snow Entomological Museum.

Megamelus coronus n.sp.

MACROPTEROUS FORM. Resembles *Megamelus metzaria* Crawford but apex of aedeagal brace with three lobes, also peg between inner lobes on ninth segment, bifid and very large. Length ♂ 2.5 mm.

Structure: First antennal segment a little more than half as long as second; crown more than twice as long as apical width, projecting in front of eyes about one-fourth its length, carinate.

Color: General color amber, sides of pronotum and all of metanotum darker brown; elytra more or less milky with a fuscous spot on tip of clavus and veins darker.

Genitalia: Genital capsule with lobes of ninth segment about half as long as capsule; inner lobes about half as long as outer, apices sharp on inner corner, rounded on outer, with a large bilobed process between their bases; styles enlarged on outer fifth, outer corner longest, more than twice length of inner; aedeagal brace with three lobes about the same size on apex; aedeagus long and slender with a recurved apex containing two processes of about same size.

Holotype male, Harris Co., Texas, July 28, 1928, J. G. Shaw, in the Snow Entomological Museum.

(To be concluded)

NOTICE TO CONTRIBUTORS

For uniformity and for economy of space, authors are requested to give generic and specific descriptions in telegraphic style, *i.e.* with minimal use of articles and verbs. Synonymies, bibliographies, paragraphing and punctuation will be edited to conform with the style used generally in this issue unless the author, when submitting his manuscript, specifically asks that no such changes be made.

CHARGE TO AUTHORS FOR REPRINTS

Number of Reprints	*Charge per page*	*Min'm. chg. 1-2 pages*
100	1.35	3.75
150	1.68	4.50
200	2.01	5.25
250	2.34	6.00
300	2.67	6.75
350	3.00	7.50
400	3.33	8.25
450	3.66	9.00
500	3.99	9.75

PRICE OF BACK VOLUMES

Back Volumes $2.50 per volume

Subscriptions for back volumes or numbers should be sent to Donald A. Wilbur, Department of Entomology, Kansas State College, Manhattan, Kansas.

CONTENTS OF THIS NUMBER

Notes on Distribution of the Western Corn Rootworm, *Diabrotica virgifera* Lec., in Kansas (Coleoptera: Chrysomelidae)
C. C. Burkhardt and Harry R. Bryson 1

The *Dacus (Afrocadus)* Bezzi of the World (Tephritidae, Diptera)
D. Elmo Hardy 3

An Annotated List of Pompilid Wasps Taken at Blackjack Creek, Pottawatomie County, Kansas (Hymenoptera)
Howard E. Evans and Carl M. Yoshimoto 16

Biological Studies in the Genus *Periclista*
Robert E. Beer 19

A New Species of *Merragata* (Hemiptera: Hebridae) from Mexico
T. Wayne Porter 27

A Revision of the Genus *Megamelus* in America North of Mexico (Homoptera, Fulgoridae, Delphacinae)
R. H. Beamer 29